

APPENDIX B  
WATER QUALITY DATA

ORGANIZATION:

I. GROUND-WATER DATA

1. Ascending Townships: 21N, 22N, 23N
2. Ascending Ranges: 1W, 2W, 3W
3. Ascending Section Numbers

II. SURFACE-WATER DATA

1. Greenfields Main Canal
2. Spring Coulee
3. Tank Coulee
4. Flume #5
5. Flume #3

MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 81Q0161

STATE MONTANA COUNTY CASCADE  
LATITUDE-LONGITUDE 47°35'49"N 111°42'53"W SITE LOCATION 21N 1W 3 DCDD  
UTM COORDINATES Z12 N5271550 E446250 MBMG SITE  
TOPOGRAPHIC MAP VAUGHN 15' STATION ID 473549111425301  
GEOLOGIC SOURCE 110TRRC\* \* SAMPLE SOURCE WELL  
DRAINAGE BASIN ED LAND SURFACE ALTITUDE 3898.0 FT < 1.  
AGENCY + SAMPLER MBMG\*RAM SUSTAINED YIELD  
BOTTLE NUMBER FAIR 12 YIELD MEAS METHOD  
DATE SAMPLED 03-APR-81 TOTAL DEPTH OF WELL 21. FT (M)  
TIME SAMPLED 09:15 HOURS SWL ABOVE(-) OR BELOW GS 15.79 FT (M)  
LAB + ANALYST MBMG\*FNA CASING DIAMETER 6 IN (M)  
DATE ANALYZED 01-JUN-81 CASING TYPE STEEL  
SAMPLE HANDLING 5330 COMPLETION TYPE 01%  
METHOD SAMPLED PUMPED PERFORATION INTERVAL  
WATER USE DOMESTIC AND STOCK

SAMPLING SITE GEBHARDT, ED \* APPROX 8 MI S OF POWER \*  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L | MEQ/L |                      | MG/L  | MEQ/L |
|----------------|------|-------|----------------------|-------|-------|
| CALCIUM (CA)   | 24.4 | 1.22  | BICARBONATE (HCO3)   | 412.0 | 6.75  |
| MAGNESIUM (MG) | 72.5 | 5.96  | CARBONATE (CO3)      | .0    |       |
| SODIUM (NA)    | 37.2 | 1.62  | CHLORIDE (CL)        | 6.5   | 0.18  |
| POTASSIUM (K)  | 1.1  | 0.03  | SULFATE (SO4)        | 74.0  | 1.54  |
| IRON (FE)      | .056 | 0.00  | NITRATE (AS N)       | 3.32  | 0.24  |
| MANGANESE (MN) | .003 | 0.00  | FLUORIDE (F)         | .86   | 0.05  |
| SILICA (SiO2)  | 10.3 |       | PHOSPHATE TOT (AS P) |       |       |

TOTAL CATIONS 8.83 TOTAL ANIONS 8.76

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) 0.31

|                                |        |                           |        |
|--------------------------------|--------|---------------------------|--------|
| LABORATORY PH                  | 7.91   | TOTAL HARDNESS AS CaCO3   | 359.34 |
| FIELD WATER TEMPERATURE        | 9.0 C  | TOTAL ALKALINITY AS CaCO3 | 337.91 |
| CALCULATED DISSOLVED SOLIDS    | 433.19 | SODIUM ADSORPTION RATIO   | 0.85   |
| SUM OF DISS. CONSTITUENT       | 642.24 | RYZNAR STABILITY INDEX    | 7.26   |
| LAB SPEC. COND. (MICROMHOS/CM) | 781.3  | LANGLIER SATURATION INDEX | 0.33   |

| PARAMETER                  | VALUE | PARAMETER                   | VALUE |
|----------------------------|-------|-----------------------------|-------|
| ALUMINUM, DISS (MG/L-AL)   | 388.  | PH, FIELD (SU)              | 7.66  |
| SILVER, DISS (MG/L AS AG)  | <.03  | NICKEL, DISS (MG/L AS NI)   | .01   |
| ORON, DISS (MG/L AS B)     | <.002 | LEAD, DISS (MG/L AS PB)     | <.04  |
| ADMIUM, DISS (MG/L AS CD)  | <.02  | STRONTIUM, DISS (MG/L-SR)   | .47   |
| HRONIUM, DISS (MG/L-CR)    | <.002 | TITANIUM DISS (MG/L AS TI)  | <.001 |
| OPPER, DISS (MG/L AS CU)   | <.002 | VANADIUM, DISS (MG/L AS V)  | .003  |
| ITHIUM, DISS (MG/L AS LI)  | <.002 | ZINC, DISS (MG/L AS ZN)     | .018  |
| OLYBDENUM, DISS (MG/L-MO)  | .028  | ZIRCONIUM DISS (MG/L AS ZR) | <.004 |
| PHOSPHORUS, TOTAL (MG/L-P) | <.02  | SELENIUM, DISS (UG/L-SE)    | 2.3   |
| -PHOSPHATE, DISS (MG/L-P)  | .007  | NITROGEN, KJEL, TO (MG/L-N) | <.1   |
|                            | .004  |                             |       |

EXPLANATION: MG/L = MILLIGRAMS PER LITER, UG/L = MICROGRAMS PER LITER, MEQ/L = MILLIEQUIVALENTS PER LITER, FT = FEET, MT = METERS, (M) = MEASURED, (E) = ESTIMATED, (R) = REPORTED, TR = TOTAL RECOVERABLE, TOT = TOTAL.

QW WA S2 WI OW PW AT OTHER

OTHER AVAILABLE DATA  
OTHER FILE NUMBERS:

PROJECT: COST:  
LAST EDIT DATE: 15-JUN-81 BY: TP \*MJT  
PROCESSING PROGRAM: F1730P V2 (11/3/81) PRINTED: 05-MAY-83

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
13.8 67.6 18.3 0.3 2.2 18.2 79.7 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 81Q0161

MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)493-4101

WATER QUALITY ANALYSIS  
LAB NO. 81Q0162

STATE MONTANA COUNTY JETON  
LATITUDE-LONGITUDE 47°37'29"N 111°44'25"W SITE LOCATION 22N 1W 33 ABBB  
UTM COORDINATES Z N E MBMG SITE  
TOPOGRAPHIC MAP VAUGHN 15' STATION ID 473729111442501  
GEOLOGIC SOURCE 110TRRC\* \* SAMPLE SOURCE WELL  
DRAINAGE BASIN BD LAND SURFACE ALTITUDE 3829.0 FT < 1.  
AGENCY + SAMPLER MBMG\*RAM SUSTAINED YIELD  
BOTTLE NUMBER FAIR 13 YIELD MEAS METHOD  
DATE SAMPLED 03-APR-81 TOTAL DEPTH OF WELL  
TIME SAMPLED 10:36 HOURS SWL ABOVE(-) OR BELOW GS 10.00 FT (M)  
LAB + ANALYST MEMG\*FNA CASING DIAMETER 6 IN (M)  
DATE ANALYZED 03-JUN-81 CASING TYPE STEEL  
SAMPLE HANDLING 5330 COMPLETION TYPE 01\*  
METHOD SAMPLED PUMPED PERFORATION INTERVAL  
WATER USE DOMESTIC AND STOCK

SAMPLING SITE MANGOLD, GERALD\*APPROX 6.5 MI SW OF POWER  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L | MEQ/L |                      | MG/L | MEQ/L |
|----------------|------|-------|----------------------|------|-------|
| CALCIUM (CA)   | 32.1 | 1.60  | BICARBONATE (HCO3)   | 576. | 9.44  |
| MAGNESIUM (MG) | 97.6 | 8.03  | CARBONATE (CO3)      | .0   |       |
| SODIUM (NA)    | 99.6 | 4.33  | CHLORIDE (CL)        | 31.8 | 0.90  |
| POTASSIUM (K)  | 1.4  | 0.04  | SULFATE (SO4)        | 171. | 3.56  |
| IRON (FE)      | .017 | 0.00  | NITRATE (AS N)       | 5.69 | 0.41  |
| MANGANESE (MN) | .002 | 0.00  | FLUORIDE (F)         | 1.36 | 0.07  |
| SILICA (SIO2)  | 10.3 |       | PHOSPHATE TOT (AS P) |      |       |

TOTAL CATIONS 14.00 TOTAL ANIONS 14.38

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) 1.20

| CALCULATED DISSOLVED SOLIDS | 734.61  | TOTAL HARDNESS AS CaCO3   | 481.88 |
|-----------------------------|---------|---------------------------|--------|
| SUM OF DISS. CONSTITUENT    | 1026.87 | TOTAL ALKALINITY AS CaCO3 | 472.42 |
| FIELD CONDUCTVY, MICROMHOS  |         | FIELD ALKALINITY AS CaCO3 | 488.   |
| LAB CONDUCTVY, MICROMHOS    | 1241.   | RYZKAR STABILITY INDEX    | 6.76   |
| FIELD PH                    | 7.52    | LANGLIER SATURATION INDEX | 0.56   |
| LABORATORY PH               | 7.88    | SODIUM ADSORPTION RATIO   | 1.97   |

| PARAMETER                  | VALUE | PARAMETER                   | VALUE |
|----------------------------|-------|-----------------------------|-------|
| FIELD TEMP. WATER          | 7.0 C |                             |       |
| ALUMINUM, DISS (MG/L-AL)   | <.03  | NICKEL, DISS (MG/L AS NI)   | .02   |
| SILVER, DISS (MG/L AS AG)  | <.002 | LEAD, DISS (MG/L AS PB)     | <.04  |
| BORON, DISS (MG/L AS B)    | <.02  | STRONTIUM, DISS (MG/L-SR)   | .79   |
| CADMIUM, DISS (MG/L AS CD) | <.002 | TITANIUM DISS (MG/L AS TI)  | .024  |
| CHROMIUM, DISS (MG/L-CR)   | <.002 | VANADIUM, DISS (MG/L AS V)  | <.001 |
| COPPER, DISS (MG/L AS CU)  | <.002 | ZINC, DISS (MG/L AS ZN)     | .041  |
| LITHIUM, DISS (MG/L AS LI) | .055  | ZIRCONIUM DISS (MG/L AS ZR) | <.004 |
| MOLYBDENUM, DISS (MG/L-MO) | <.02  | SELENIUM, DISS (UG/L-SE)    | 19.4  |
| PHOSPHORUS, TOTAL (MG/L-P) | .003  | NITROGEN, KJEL, TO (MG/L-N) | <.1   |
| O-PHOSPHATE, DISS (MG/L-P) | <.003 |                             |       |

REMARKS: OWNER: GERALD MANGOLD \*  
LAB: FU NA OF 104 GIVES .558 SIGMA \*

EXPLANATION: MG/L = MILLIGRAMS PER LITER; UG/L = MICROGRAMS PER LITER; MEQ/L = MILLIEQUIVALENTS PER LITER, FT = FEET, MI = METERS, (M) = MEASURED, (E) = ESTIMATED, (R) = REPORTED, TR = TOTAL RECOVERABLE, TOT = TOTAL, BIO = BIOLOGICALLY AVAILABLE.

OTHER AVAILABLE DATA QW NA S2 WJ QW PW AT OTHER  
OTHER FILE NUMBERS:

PROJECT: COST:  
LAST EDIT DATE: 12-MAR-84 BY: TP \*BCS  
PROCESSING PROGRAM: F1730P V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
11.4 57.4 30.9 0.3 6.3 25.6 67.9 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 81Q0162



MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 81Q1563

STATE MONTANA COUNTY CASCADE  
LATITUDE-LONGITUDE 47D35'49"N 111D42'53"W SITE LOCATION 21N 1W 3 DCDD 01  
UTM COORDINATES Z N E MBMG SITE  
TOPOGRAPHIC MAP VAUGHN 15' STATION ID 473549111425301  
GEOLOGIC SOURCE 110TRRC\* \* \* SAMPLE SOURCE WELL  
DRAINAGE BASIN BD LAND SURFACE ALTITUDE 3898.0 FT < 10  
AGENCY + SAMPLER MBMG\*RAM SUSTAINED YIELD  
BOTTLE NUMBER FR2-12S YIELD MEAS METHOD  
DATE SAMPLED 03-SEP-81 TOTAL DEPTH OF WELL 21.0 FT (M)  
TIME SAMPLED 15:10 HOURS SWL ABOVE(-) OR BELOW GS 5.14 FT (M)  
LAB + ANALYST MBMG\*FNA CASING DIAMETER 6 IN (M)  
DATE ANALYZED 15-OCT-81 COMPLETION TYPE STEEL  
SAMPLE HANDLING 4230 PERFORATION INTERVAL 01\*  
METHOD SAMPLED PUMPED  
WATER USE DOMESTIC

SAMPLING SITE GEBHARDT, ED: APPROX 8 MI SOUTH OF POWER \*  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L  | MEQ/L |                      | MG/L | MEQ/L |
|----------------|-------|-------|----------------------|------|-------|
| CALCIUM (CA)   | 22.1  | 1.10  | BICARBONATE (HCO3)   | 405. | 6.64  |
| MAGNESIUM (MG) | 66.   | 5.43  | CARBONATE (CO3)      | 0.   |       |
| SODIUM (NA)    | 35.   | 1.52  | CHLORIDE (CL)        | 5.6  | 0.16  |
| POTASSIUM (K)  | .8    | 0.02  | SULFATE (SO4)        | 69.3 | 1.44  |
| IRON (FE)      | .006  | 0.00  | NITRATE (AS N)       | 4.11 | 0.29  |
| MANGANESE (MN) | <.001 |       | FLUORIDE (F)         | .79  | 0.04  |
| SILICA (SIO2)  | 10.3  |       | PHOSPHATE TOT (AS P) |      |       |

TOTAL CATIONS 8.08 TOTAL ANIONS 8.57

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) 2.19

|                             |        |                           |        |
|-----------------------------|--------|---------------------------|--------|
| LABORATORY PH               | 8.11   | TOTAL HARDNESS AS CACO3   | 326.84 |
| FIELD WATER TEMPERATURE     | 10.0 C | TOTAL ALKALINITY AS CACO3 | 332.17 |
| CALCULATED DISSOLVED SOLIDS | 413.51 | SODIUM ADSORPTION RATIO   | 0.84   |
| SUM OF DISS. CONSTITUENT    | 619.01 | RYZNAR STABILITY INDEX    | 7.16   |
| SPEC.COND.(MICROMHOS/CM)    | 735.6  | LANGLIER SATURATION INDEX | 0.48   |

| PARAMETER                  | VALUE | PARAMETER                | VALUE |
|----------------------------|-------|--------------------------|-------|
| CONDUCTVY, FIELD MICROMHOS | 713.  | FIELD PH                 | 7.15  |
| ALKALINITY, FLD(AS CACO3)  | 336.0 | DISSLVD SOLIDS(CALC MG/L | 414.  |
| LITHIUM, DISS(MG/L AS LI)  | .036  |                          |       |

LAB: FU MAGNESIUM 69.1 MG/L GIVES .07 SIGMA & TOTAL MEQ/L CATIONS OF 8.3

EXPLANATION: MG/L = MILLIGRAMS PER LITER, UG/L = MICROGRAMS PER LITER, MEQ/L = MILLIEQUIVELENTS PER LITER. FT = FEET, MT = METERS. (M) = MEASURED, (E) = ESTIMATED, (R) = REPORTED. TR = TOTAL RECOVERABLE. TOT = TOTAL.

QW WA S2 W1 OW PW AT OTHER

OTHER AVAILABLE DATA  
OTHER FILE NUMBERS:

PROJECT: COST:  
LAST EDIT DATE: 04-FEB-83 BY: TP \*BCS  
PROCESSING PROGRAM: F1730P V2 (11/3/81) PRINTED: 05-MAY-83

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
13.7 67.2 18.9 0.3 1.9 17.5 80.6 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 81Q1563



MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 82Q0242

|                    |                        |                          |                 |
|--------------------|------------------------|--------------------------|-----------------|
| STATE              | MONTANA                | COUNTY                   | TETON           |
| LATITUDE-LONGITUDE | 47D40'29"N 111D50'10"W | SITE LOCATION            | 22N 02W 11*CRBB |
| UTM COORDINATES    | Z N E                  | MBMG SITE                |                 |
| TOPOGRAPHIC MAP    | FAIRFIELD 15'          | STATION IN               | 474029111501001 |
| GEOLOGIC SOURCE    | 110TRRC*               | SAMPLE SOURCE            | WELL            |
| DRAINAGE BASIN     | BD                     | LAND SURFACE ALTITUDE    | 3835. FT < 1.   |
| AGENCY + SAMPLER   | MBMG*AN                | SUSTAINED YIELD          |                 |
| BOTTLE NUMBER      | FAIR 2U                | YIELD MEAS METHOD        |                 |
| DATE SAMPLED       | 11-MAY-82              | TOTAL DEPTH OF WELL      | 12.8 FT (M)     |
| TIME SAMPLED       | 16:20 HOURS            | SWL ABOVE(-) OR BELOW GS | 11.36 FT (M)    |
| LAB + ANALYST      | MBMG*FNA               | CASING DIAMETER          | 18 IN (M)       |
| DATE ANALYZED      | 18-JUN-82              | CASING TYPE              | CULVERT         |
| SAMPLE HANDLING    | 4230                   | COMPLETION TYPE          | 01*01           |
| METHOD SAMPLED     | PUMPED                 | PERFORATION INTERVAL     |                 |
| WATER USE          | DOMESTIC               |                          |                 |

SAMPLING SITE WINTER, JOHN \* 8 MILES NE OF FAIRFIELD  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L | MEQ/L |                      | MG/L | MEQ/L |
|----------------|------|-------|----------------------|------|-------|
| CALCIUM (CA)   | 41.6 | 2.08  | BICARBONATE (HCO3)   | 393. | 6.44  |
| MAGNESIUM (MG) | 62.6 | 5.15  | CARBONATE (CO3)      | .0   |       |
| SODIUM (NA)    | 54.9 | 2.39  | CHLORIDE (CL)        | 7.7  | 0.22  |
| POTASSIUM (K)  | .9   | 0.02  | SULFATE (SO4)        | 136. | 2.83  |
| IRON (FE)      | .018 | 0.00  | NITRATE (AS N)       | 5.13 | 0.37  |
| MANGANESE (MN) | .003 | 0.00  | FLUORIDE (F)         | .91  | 0.05  |
| SILICA (SIO2)  | 10.9 |       | PHOSPHATE TOT (AS P) |      |       |

TOTAL CATIONS 9.64 TOTAL ANIONS 9.90

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) 1.07

|                             |        |                           |        |
|-----------------------------|--------|---------------------------|--------|
| CALCULATED DISSOLVED SOLIDS | 514.26 | TOTAL HARDNESS AS CaCO3   | 361.54 |
| SUM OF DISS. CONSTITUENT    | 713.66 | TOTAL ALKALINITY AS CaCO3 | 322.33 |
| FIELD CNDUCTVY, MICROMHOS   | 880.   | FIELD ALKALINITY AS CaCO3 | 314.0  |
| LAB CNDUCTVY, MICROMHOS     | 847.1  | RYZNAR STABILITY INDEX    | 7.17   |
| FIELD PH                    | 7.61   | LANGLIER SATURATION INDEX | 0.21   |
| LABORATORY PH               | 7.58   | SODIUM ADSORPTION RATIO   | 1.26   |

| PARAMETER                  | VALUE  | PARAMETER                  | VALUE  |
|----------------------------|--------|----------------------------|--------|
| FIELD TEMP. AIR            | 17.0 C | FIELD TEMP. WATER          | 21.5 C |
| LITHIUM, DISS (MG/L AS LI) | .047   | DISSLVD SOLIDS (CALC MG/L) | 514.   |

REMARKS: THERE IS A MOAT AROUND HOUSE  
LAB: FU CA 43.2, MG 65.6, NA 57.1 GIVES 10.1 MEQ CATIONS FOR -.60 SIGMA

EXPLANATION: MG/L = MILLIGRAMS PER LITER, UG/L = MICROGRAMS PER LITER, MEQ/L = MILLIEQUIVELENTS PER LITER. FT = FEET, MT = METERS. (M) = MEASURED, (E) = ESTIMATED, (R) = REPORTED. TR = TOTAL RECOVERABLE, TOT = TOTAL. BIO = BIOLOGICALLY AVAILABLE.

|                      | QW | WA | S2 | WI | OW | PW | AT | OTHER |
|----------------------|----|----|----|----|----|----|----|-------|
| OTHER AVAILABLE DATA | Y  |    |    |    |    |    |    |       |
| OTHER FILE NUMBERS:  |    |    |    |    |    |    |    |       |

|                                         |  |                    |  |
|-----------------------------------------|--|--------------------|--|
| PROJECT:                                |  | COST:              |  |
| LAST EDIT DATE: 23-SEP-83               |  | BY: TP *JKS        |  |
| PROCESSING PROGRAM: F1730P V3 (09/1/83) |  | PRINTED: 30-AUG-84 |  |

| PERCENT MEQ/L (FOR PIPER PLOT) |      |      |     |     |      |      |     |
|--------------------------------|------|------|-----|-----|------|------|-----|
| CA                             | MG   | NA   | K   | CL  | SO4  | HCO3 | CO3 |
| 21.5                           | 53.4 | 24.8 | 0.2 | 2.3 | 29.8 | 67.9 | 0.0 |

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 82Q0242

MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB. NO. 82Q0252

STATE MONTANA COUNTY CASCADE  
LATITUDE-LONGITUDE 47°35'49"N 111°042'53"W SITE LOCATION 21N 1W 3\*DCDD 01  
UTM COORDINATES Z N E MBMG SITE  
TOPOGRAPHIC MAP VAUGHN 15' STATION ID 473549111425301  
GEOLOGIC SOURCE 110TRRC\* \* SAMPLE SOURCE WELL  
DRAINAGE BASIN BD LAND SURFACE ALTITUDE 3898.0 FT < 10  
AGENCY + SAMPLER MBMG\*RAM SUSTAINED YIELD  
BOTTLE NUMBER FAIR12U YIELD MEAS METHOD  
DATE SAMPLED 13-MAY-82 TOTAL DEPTH OF WELL 21.0 FT (M)  
TIME SAMPLED 14:50 HOURS SWL ABOVE(-) OR BELOW GS 17.80 FT (M)  
LAB + ANALYST MBMG\*ENG CASING DIAMETER 6 IN (M)  
DATE ANALYZED 10-JUN-82 CASING TYPE STEEL  
SAMPLE HANDLING 4230 COMPLETION TYPE 01\*01  
METHOD SAMPLED PUMPED PERFORATION INTERVAL  
WATER USE DOMESTIC

SAMPLING SITE GERHARDT, ED\*APPROX. 8 MI S OF POWER  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L   | MEQ/L |                      | MG/L | MEQ/L |
|----------------|--------|-------|----------------------|------|-------|
| CALCIUM (CA)   | 24.6   | 1.23  | BICARBONATE (HCO3)   | 411. | 6.74  |
| MAGNESIUM (MG) | 22.6   | 5.87  | CARBONATE (CO3)      | 5.3  | 0.15  |
| SODIUM (NA)    | 35.5   | 1.54  | CALCIDE (CL)         | 69.2 | 1.44  |
| POTASSIUM (K)  | 1.0    | 0.03  | SULFATE (SO4)        | 4.38 | 0.31  |
| IRON (FE)      | 0.015  | 0.00  | NITRATE (AS N)       | .89  | 0.05  |
| MANGANESE (MN) | 10.001 | 0.00  | PHOSPHATE TOT (AS P) |      |       |
| SILICA (SiO2)  | 10.3   |       |                      |      |       |

TOTAL CATIONS 8.77 TOTAL ANIONS 8.69

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) -0.37

| PARAMETER                   | VALUE  | PARAMETER                 | VALUE  |
|-----------------------------|--------|---------------------------|--------|
| CALCULATED DISSOLVED SOLIDS | 426.25 | TOTAL HARDNESS AS CaCO3   | 360.25 |
| SUM OF DISS. CONSTITUENT    | 634.79 | TOTAL ALKALINITY AS CaCO3 | 337.09 |
| FIELD CONDUCTVY, MICROMHOS  | 662.   | FIELD ALKALINITY AS CaCO3 | 342.0  |
| LAB CONDUCTVY, MICROMHOS    | 737.8  | RYZNAR STABILITY INDEX    | 7.47   |
| FIELD PH                    | 7.85   | LANGLIER SATURATION INDEX | 0.11   |
| LABORATORY PH               | 7.69   | SODIUM ADSORPTION RATIO   | 0.81   |

| PARAMETER                 | VALUE  | PARAMETER         | VALUE |
|---------------------------|--------|-------------------|-------|
| FIELD TEMP, AIR           | 21.5 C | FIELD TEMP, WATER | 9.0 C |
| DISSOLVD SOLIDS(CALC MG/L | 426.   |                   |       |

REMARKS: GERMAN SHEPERD IS FRIENDLY

EXPLANATION: MG/L = MILLIGRAMS PER LITER; UG/L = MICROGRAMS PER LITER; MEQ/L = MILLIEQUIVALENTS PER LITER; FT = FEET; MT = METERS; (M) = MEASURED; (E) = ESTIMATED; (R) = REPORTED; TR = TOTAL RECOVERABLE; TOT = TOTAL; BIO = BIOLOGICALLY AVAILABLE.

OTHER AVAILABLE DATA QW WA S2 WJ OW PW AT OTHER  
Y  
OTHER FILE NUMBERS:

PROJECT: COST:  
LAST EDIT DATE: 23-SEP-83 BY: TP \*JKS  
PROCESSING PROGRAM: F1730P V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
14.0 68.1 17.6 0.3 1.8 17.3 80.9 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 82Q0252



MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 81Q0154

STATE MONTANA COUNTY CASCADE  
LATITUDE-LONGITUDE 47D35'49"N 111D46'58"W SITE LOCATION 21N 1W 6 DCCC  
UTM COORDINATES Z N E MBMG SITE  
TOPOGRAPHIC MAP FAIRFIELD 15' STATION ID 473549111465801  
GEOLOGIC SOURCE 110TRRC\* \* SAMPLE SOURCE WELL  
DRAINAGE BASIN BD LAND SURFACE ALTITUDE 3986.0 FT < 1.  
AGENCY + SAMPLER MRMG\*RAM SUSTAINED YIELD 8.0 GPM  
BOTTLE NUMBER FAIR 5 YIELD MEAS METHOD REPORTED  
X DATE SAMPLED 04-FEB-81 TOTAL DEPTH OF WELL 19.1 FT (M)  
TIME SAMPLED 08:41 HOURS SWL ABOVE(-) OR BELOW GS 10.13 FT (M)  
LAB ANALYST MBMG\*FNA CASING DIAMETER 6 IN (M)  
DATE ANALYZED 13-MAY-81 CASING TYPE STEEL  
SAMPLE HANDLING 5330 COMPLETION TYPE 02%  
METHOD SAMPLED PUMPED PERFORATION INTERVAL 10 TO 20 FT (R)  
WATER USE DOMESTIC AND STOCK

SAMPLING SITE GROSSMAN, GORDON\*APPROX 9 MI E OF FAIRFIELD  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L  | MEQ/L |                      | MG/L | MEQ/L |
|----------------|-------|-------|----------------------|------|-------|
| CALCIUM (CA)   | 47.5  | 2.37  | BICARBONATE (HCO3)   | 522. | 8.56  |
| MAGNESIUM (MG) | 92.7  | 7.63  | CARBONATE (CO3)      | .0   |       |
| SODIUM (NA)    | 59.4  | 2.58  | CHLORIDE (CL)        | 34.4 | 0.97  |
| POTASSIUM (K)  | 1.7   | 0.04  | SULFATE (SO4)        | 91.5 | 1.91  |
| IRON (FE)      | .012  | 0.00  | NITRATE (AS N)       | 16.0 | 1.14  |
| MANGANESE (MN) | <.001 |       | FLUORIDE (F)         | .68  | 0.04  |
| SILICA (SIO2)  | 10.7  |       | PHOSPHATE TOT (AS P) |      |       |

TOTAL CATIONS 12.62 TOTAL ANIONS 12.61

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) -0.06

|                               |        |                           |        |
|-------------------------------|--------|---------------------------|--------|
| CALCULATED DISSOLVED SOLIDS   | 611.73 | TOTAL HARDNESS AS CaCO3   | 500.16 |
| SUM OF DISS. CONSTITUENT      | 876.59 | TOTAL ALKALINITY AS CaCO3 | 428.13 |
| FIELD CONDUCTIVITY, MICROMHOS | 1041.  | FIELD ALKALINITY AS CaCO3 | 456.   |
| LAB CONDUCTIVITY, MICROMHOS   | 1154.  | RYZNAR STABILITY INDEX    | 6.64   |
| FIELD PH                      | 7.46   | LANGLIER SATURATION INDEX | 0.55   |
| LABORATORY PH                 | 7.74   | SODIUM ADSORPTION RATIO   | 1.16   |

| PARAMETER                  | VALUE | PARAMETER                   | VALUE |
|----------------------------|-------|-----------------------------|-------|
| FIELD TEMP. WATER          | 7.0 C |                             |       |
| ALUMINUM, DISS (MG/L-AL)   | <.03  | NICKEL, DISS (MG/L AS NI)   | <.01  |
| SILVER, DISS (MG/L AS AG)  | <.002 | LEAD, DISS (MG/L AS PB)     | <.04  |
| BORON, DISS (MG/L AS B)    | <.02  | STRONTIUM, DISS (MG/L-SR)   | .86   |
| CADMIUM, DISS (MG/L AS CD) | <.002 | TITANIUM DISS (MG/L AS TI)  | <.001 |
| CHROMIUM, DISS (MG/L-CR)   | <.002 | VANADIUM, DISS (MG/L AS V)  | <.001 |
| COPPER, DISS (MG/L AS CU)  | <.002 | ZINC, DISS (MG/L AS ZN)     | <.004 |
| LITHIUM, DISS (MG/L AS LI) | .051  | ZIRCONIUM DISS (MG/L AS ZR) | <.004 |
| MOLYBDENUM, DISS (MG/L-MO) | <.02  | SELENIUM, DISS (UG/L-SE)    | 3.8   |
| PHOSPHORUS, TOTAL (MG/L-P) | <.003 | CARBON, TOT, ORG. (MG/L-C)  | 2.5   |
| O-PHOSPHATE, DISS (MG/L-P) | <.003 | NITROGEN, KJEL, TO (MG/L-N) | .1    |

EXPLANATION: MG/L = MILLIGRAMS PER LITER; UG/L = MICROGRAMS PER LITER; MEQ/L = MILLIEQUIVALENTS PER LITER; FT = FEET; MT = METERS; (M) = MEASURED; (E) = ESTIMATED; (R) = REPORTED; TR = TOTAL RECOVERABLE; TOT = TOTAL; BIO = BIOLOGICALLY AVAILABLE.

OTHER AVAILABLE DATA QW WA S2 WI OW PW AT OTHER  
OTHER FILE NUMBERS: Y Y

PROJECT: COST:  
LAST EDIT DATE: 27-MAY-81 BY: TP \*MJT  
PROCESSING PROGRAM: F1730P V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
18.8 60.4 20.5 0.3 8.5 16.7 74.8 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 81Q0154

MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 81Q1556

|                    |                        |                          |                 |
|--------------------|------------------------|--------------------------|-----------------|
| STATE              | MONTANA                | COUNTY                   | CASCADE         |
| LATITUDE-LONGITUDE | 47D35'49"N 111D46'58"W | SITE LOCATION            | 21N 1W 6 DCCC   |
| UTM COORDINATES    | Z N E                  | MBMG SITE                |                 |
| TOPOGRAPHIC MAP    | FAIRFIELD 15'          | STATION ID               | 473549111465801 |
| GEOLOGIC SOURCE    | 110TRRC*               | * SAMPLE SOURCE          | WELL            |
| DRAINAGE BASIN     | RD                     | LAND SURFACE ALTITUDE    | 3986.0 FT < 10  |
| AGENCY + SAMPLER   | NBMG*AN                | SUSTAINED YIELD          |                 |
| BOTTLE NUMBER      | FR#2-5S                | YIELD MEAS METHOD        |                 |
| DATE SAMPLED       | 03-SEP-81              | TOTAL DEPTH OF WELL      | 19.1 FT (M)     |
| TIME SAMPLED       | 15:50 HOURS            | SWL ABOVE(-) OR BELOW GS | 5.69 FT (M)     |
| LAB + ANALYST      | NBMG*FNA               | CASING DIAMETER          | 6 IN (M)        |
| DATE ANALYZED      | 13-OCT-81              | CASING TYPE              | STEEL           |
| SAMPLE HANDLING    | 4230                   | COMPLETION TYPE          | 01*             |
| METHOD SAMPLED     | PUMPED                 | PERFORATION INTERVAL     |                 |
| WATER USE          | DOMESTIC               |                          |                 |

SAMPLING SITE GROSSMAN, GORDON; APPROX 9 MI E FAIRFIELD  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L  | MEQ/L |                      | MG/L | MEQ/L |
|----------------|-------|-------|----------------------|------|-------|
| CALCIUM (CA)   | 29.   | 1.45  | BICARBONATE (HCO3)   | 358. | 5.87  |
| MAGNESIUM (MG) | 56.2  | 4.62  | CARBONATE (CO3)      | 0.   |       |
| SODIUM (NA)    | 31.9  | 1.39  | CHLORIDE (CL)        | 9.9  | 0.28  |
| POTASSIUM (K)  | 1.5   | 0.04  | SULFATE (SO4)        | 45.8 | 0.95  |
| IRON (FE)      | .019  | 0.00  | NITRATE (AS N)       | 4.41 | 0.31  |
| MANGANESE (MN) | <.001 |       | FLUORIDE (F)         | .84  | 0.04  |
| SILICA (SIO2)  | 10.0  |       | PHOSPHATE TOT (AS P) |      |       |

TOTAL CATIONS 7.50 TOTAL ANIONS 7.46

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) -0.18

|                             |        |                           |        |
|-----------------------------|--------|---------------------------|--------|
| CALCULATED DISSOLVED SOLIDS | 365.92 | TOTAL HARDNESS AS CaCO3   | 303.73 |
| SUM OF DISS. CONSTITUENT    | 347.57 | TOTAL ALKALINITY AS CaCO3 | 293.62 |
| FIELD CONDUCTVY, MICROMHOS  | 600.   | FIELD ALKALINITY AS CaCO3 | 292.0  |
| LAB CONDUCTVY, MICROMHOS    | 609.8  | RYZNAR STABILITY INDEX    | 6.86   |
| FIELD PH                    | 7.29   | LANGLIER SATURATION INDEX | 0.71   |
| LABORATORY PH               | 8.28   | SODIUM ADSORPTION RATIO   | 0.80   |

| PARAMETER                  | VALUE | PARAMETER                   | VALUE |
|----------------------------|-------|-----------------------------|-------|
| FIELD TEMP, WATER          | 9.5 C |                             |       |
| LITHIUM, DISS (MG/L AS LI) | .041  | DISSOLVD SOLIDS (CALC MG/L) | 366.  |

EXPLANATION: MG/L = MILLIGRAMS PER LITER; UG/L = MICROGRAMS PER LITER; MEQ/L = MILLIEQUIVALENTS PER LITER. FT = FEET; MT = METERS. (M) = MEASURED; (E) = ESTIMATED; (R) = REPORTED; TR = TOTAL RECOVERABLE; TOT = TOTAL. BIO = BIOLOGICALLY AVAILABLE.

|                      | QW | WA | S2 | WI | OW | PW | AT | OTHER |
|----------------------|----|----|----|----|----|----|----|-------|
| OTHER AVAILABLE DATA |    | Y  |    | Y  |    |    |    |       |
| OTHER FILE NUMBERS:  |    |    |    |    |    |    |    |       |

|                                         |  |                    |  |
|-----------------------------------------|--|--------------------|--|
| PROJECT:                                |  | COST:              |  |
| LAST EDIT DATE: 04-FEB-83               |  | BY: TP *BCS        |  |
| PROCESSING PROGRAM: F1730P V3 (09/1/83) |  | PRINTED: 30-AUG-84 |  |

PERCENT MEQ/L (FOR PIPER PLOT)

| CA   | MG   | NA   | K   | CL  | SO4  | HCO3 | CO3 |
|------|------|------|-----|-----|------|------|-----|
| 19.3 | 61.7 | 18.5 | 0.5 | 3.9 | 13.4 | 82.6 | 0.0 |

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 81Q1556



MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 82Q0245

STATE MONTANA COUNTY CASCADE  
LATITUDE-LONGITUDE 47D33'54"N 91D14'65"W SITE LOCATION 21N 1W 06\*DCCC  
UTM COORDINATES Z8 N E NBMG SITE  
TOPOGRAPHIC MAP FAIRFIELD 15' STATION IN 473549111465801  
GEOLOGIC SOURCE 110TRRC\* \* SAMPLE SOURCE WELL  
DRAINAGE BASIN RD LAND SURFACE ALTITUDE 3986.0 FT < 10  
AGENCY + SAMPLER NBMG\*AN SUSTAINED YIELD  
BOTTLE NUMBER FAIR 5U YIELD MEAS METHOD  
DATE SAMPLED 13-MAY-82 TOTAL DEPTH OF WELL 19.1 FT (M)  
TIME SAMPLED 15:45 HOURS SWL ABOVE(-) OR BELOW GS 10.34 FT (M)  
LAB + ANALYST NBMG\*FNA CASING DIAMETER 6 IN (M)  
DATE ANALYZED 10-JUN-82 CASING TYPE STEEL  
SAMPLE HANDLING 4230 COMPLETION TYPE 01\*01  
METHOD SAMPLED PUMPED PERFORATION INTERVAL  
WATER USE DOMESTIC

SAMPLING SITE GROSSMAN; GORDON\*APPR 9 MI E OF FAIRFIELD  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L | MEQ/L |                      | MG/L | MEQ/L |
|----------------|------|-------|----------------------|------|-------|
| CALCIUM (CA)   | 32.6 | 1.63  | BICARBONATE (HCO3)   | 403. | 6.60  |
| MAGNESIUM (MG) | 66.6 | 5.48  | CARBONATE (CO3)      | .0   |       |
| SODIUM (NA)    | 28.0 | 1.22  | CHLORIDE (CL)        | 10.1 | 0.28  |
| POTASSIUM (K)  | .6   | 0.02  | SULFATE (SO4)        | 46.3 | 0.96  |
| IRON (FE)      | .018 | 0.00  | NITRATE (AS N)       | 7.77 | 0.55  |
| MANGANESE (MN) | .001 | 0.00  | FLUORIDE (F)         | .74  | 0.04  |
| SILICA (SIO2)  | 9.0  |       | PHOSPHATE TOT (AS P) |      |       |

TOTAL CATIONS 8.34 TOTAL ANIONS 8.45

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) 0.47

|                             |        |                           |        |
|-----------------------------|--------|---------------------------|--------|
| CALCULATED DISSOLVED SOLIDS | 400.25 | TOTAL HARDNESS AS CaCO3   | 355.53 |
| SUM OF DISS. CONSTITUENT    | 304.73 | TOTAL ALKALINITY AS CaCO3 | 330.53 |
| FIELD CONDUCTVY; MICROMHOS  | 665.   | FIELD ALKALINITY AS CaCO3 | 352.0  |
| LAB CONDUCTVY; MICROMHOS    | 722.6  | RYZNAR STABILITY INDEX    | 7.36   |
| FIELD PH                    | 7.75   | LANGLIER SATURATION INDEX | 0.11   |
| LABORATORY PH               | 7.58   | SODIUM ADSORPTION RATIO   | 0.65   |

| PARAMETER                 | VALUE  | PARAMETER         | VALUE |
|---------------------------|--------|-------------------|-------|
| FIELD TEMP. AIR           | 21.0 C | FIELD TEMP. WATER | 6.4 C |
| DISSOLVD SOLIDS(CALC MG/L | 400.   |                   |       |

REMARKS: TAKE SAMPLE FROM FAUCET ON WEST SIDE OF HOUSE

EXPLANATION: MG/L = MILLIGRAMS PER LITER; UG/L = MICROGRAMS PER LITER; MEQ/L = MILLIEQUIVALENTS PER LITER; FT = FEET; MT = METERS; (M) = MEASURED; (E) = ESTIMATED; (R) = REPORTED; TR = TOTAL RECOVERABLE; TOT = TOTAL; BIO = BIOLOGICALLY AVAILABLE.

OTHER AVAILABLE DATA QW WA S2 WI OW PW AT OTHER  
Y Y Y

PROJECT: COST:  
LAST EDIT DATE: 23-SEP-83 BY: TP \*JKS  
PROCESSING PROGRAM: F1730P V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
19.5 45.7 14.6 0.2 3.6 12.3 84.1 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 82Q0245

MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 81Q1915

STATE MONTANA COUNTY CASCADE  
LATITUDE-LONGITUDE 47D35'51"N 111D47'37"W SITE LOCATION 21N 02W 01 DDDA  
UTM COORDINATES Z N MBMG SITE  
TOPOGRAPHIC MAP FAIRFIELD 15' STATION ID 473551111473701  
GEOLOGIC SOURCE 110TRRC\* \* SAMPLE SOURCE TEST HOLE  
DRAINAGE BASIN BD LAND SURFACE ALTITUDE 3996. FT < 10  
AGENCY + SAMPLER MBMG\*AN SUSTAINED YIELD  
BOTTLE NUMBER GROS-F YIELD MEAS METHOD  
DATE SAMPLED 13-OCT-81 TOTAL DEPTH OF WELL 28. (M)  
TIME SAMPLED 13:30 HOURS SWL ABOVE(-) OR BELOW GS 20. FT (M)  
LAB + ANALYST MBMG\*FNA CASING DIAMETER 5 IN (M)  
DATE ANALYZED 19-JAN-82 CASING TYPE PVC  
SAMPLE HANDLING 3120 COMPLETION TYPE 03\*01  
METHOD SAMPLED BAILED PERFORATION INTERVAL 8 TO 24 FT (M)  
WATER USE RESEARCH

SAMPLING SITE GROSSMN TEST-PROD WELL, APP 9 M E FAIRFIELD  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L | MEQ/L |                      | MG/L  | MEQ/L |
|----------------|------|-------|----------------------|-------|-------|
| CALCIUM (CA)   | 33.2 | 1.66  | BICARBONATE (HCO3)   | 415.3 | 6.81  |
| MAGNESIUM (MG) | 60.8 | 5.00  | CARBONATE (CO3)      | .0    |       |
| SODIUM (NA)    | 26.1 | 1.14  | CHLORIDE (CL)        | 88.4  | 2.49  |
| POTASSIUM (K)  | 2.7  | 0.07  | SULFATE (SO4)        | 32.6  | 0.68  |
| IRON (FE)      | .022 | 0.00  | NITRATE (AS N)       | 1.63  | 0.12  |
| MANGANESE (MN) | .028 | 0.00  | FLUORIDE (F)         | .92   | 0.05  |
| SILICA (SIO2)  | 10.1 |       | PHOSPHATE TOT (AS P) |       |       |

TOTAL CATIONS 7.87 TOTAL ANIONS 10.14

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) 9.61

|                             |        |                           |        |
|-----------------------------|--------|---------------------------|--------|
| CALCULATED DISSOLVED SOLIDS | 461.08 | TOTAL HARDNESS AS CaCO3   | 333.15 |
| SUM OF DISS. CONSTITUENT    | 671.80 | TOTAL ALKALINITY AS CaCO3 | 340.62 |
| FIELD CONDUCTVY, MICROMHOS  | 708.   | FIELD ALKALINITY AS CaCO3 |        |
| LAB CONDUCTVY, MICROMHOS    | 615.9  | RYZNAR STABILITY INDEX    | 6.75   |
| FIELD PH                    | 8.3    | LANGLIER SATURATION INDEX | 0.69   |
| LABORATORY PH               | 8.14   | SODIUM ADSORPTION RATIO   | 0.62   |

| PARAMETER                   | VALUE | PARAMETER                    | VALUE |
|-----------------------------|-------|------------------------------|-------|
| FIELD TEMP. AIR             | 30. F | FIELD TEMP. WATER            | 6.8 C |
| ALUMINUM, DISS (MG/L-AL)    | <.03  | NICKEL, DISS (MG/L AS NI)    | .01   |
| SILVER, DISS (MG/L AS AG)   | <.002 | LEAD, DISS (MG/L AS PB)      | <.04  |
| BORON, DISS (MG/L AS B)     | .16   | STRONTIUM, DISS (MG/L-SR)    | .42   |
| CADMIUM, DISS (MG/L AS CD)  | .002  | TITANIUM, DISS (MG/L AS TI)  | .006  |
| CHROMIUM, DISS (MG/L-CR)    | <.002 | VANADIUM, DISS (MG/L AS V)   | .001  |
| COPPER, DISS (MG/L AS CU)   | <.002 | ZINC, DISS (MG/L AS ZN)      | .059  |
| LITHIUM, DISS (MG/L AS LI)  | .039  | ZIRCONIUM, DISS (MG/L AS ZR) | <.003 |
| MOLYBDENUM, DISS (MG/L-MO)  | <.02  | SELENIUM, DISS (UG/L-SE)     | 1.2   |
| DISSOLVD SOLIDS (CALC MG/L) | 461.  |                              |       |

REMARKS: SAMPLE WAS TAKEN AT THE GRAVEL-SHALE INTERFACE  
THIS IS A MBMG TEST WELL FOR AQUIFER CHARACTERISTICS & MAY BE REMOVED  
AFTER PROJECT COMPLETED\*WELL WASN'T DEVELOPED WHEN SAMPLE WAS TAKEN.  
LAB: RU FROZE IN HYDRO'S REFRIG\*FU UNREFRIG. FOR 1 WEEK BEFORE RECEIVED LAB  
LAB: RU CL OF 3.4 MG/L GIVES -.5 SIGMA

EXPLANATION: MG/L = MILLIGRAMS PER LITER; UG/L = MICROGRAMS PER LITER; MEQ/L =  
MILLIEQUIVALENTS PER LITER; FT = FEET; M = METERS; (M) = MEASURED; (E) =  
ESTIMATED; (R) = REPORTED. TR = TOTAL RECOVERABLE. TOT = TOTAL.  
BIO = BIOLOGICALLY AVAILABLE.

QW WA S2 WI OW FW AT OTHER

OTHER AVAILABLE DATA  
OTHER FILE NUMBERS:

PROJECT: COST:  
LAST EDIT DATE: 08-FEB-83 BY: JKS\*JKS  
PROCESSING PROGRAM: F1730P V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
21.1 63.6 14.4 0.9 25.0 6.8 68.2 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 81Q1915



MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 81Q0959

STATE MONTANA COUNTY CASCADE  
LATITUDE-LONGITUDE 47D35'49"N 111D48'57"W SITE LOCATION 21N 2W 2\*DDDD  
UTM COORDINATES Z N E MBMG SITE  
TOPOGRAPHIC MAP FAIRFIELD 15' STATION ID 473549111485701  
GEOLOGIC SOURCE 110TRRC\* \* SAMPLE SOURCE WELL  
DRAINAGE BASIN RD LAND SURFACE ALTITUDE 4018.0 FT < 50  
AGENCY + SAMPLER MBMG\*FNA SUSTAINED YIELD  
BOTTLE NUMBER FAIR 18 YIELD MEAS METHOD  
DATE SAMPLED 24-JUN-81 TOTAL DEPTH OF WELL 24.0 FT (R)  
TIME SAMPLED 13:20 HOURS SWL ABOVE(-) OR BELOW GS 9.70 FT (M)  
LAB + ANALYST MBMG\*FNA CASING DIAMETER 6 IN (M)  
DATE ANALYZED 04-AUG-81 CASING TYPE STEEL  
SAMPLE HANDLING 5330 COMPLETION TYPE 12\*  
METHOD SAMPLED PUMPED PERFORATION INTERVAL  
WATER USE DOMESTIC AND STOCK

SAMPLING SITE THORSEN, GLEN \*  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L  | MEQ/L |                      | MG/L | MEQ/L |
|----------------|-------|-------|----------------------|------|-------|
| CALCIUM (CA)   | 33.7  | 1.68  | BICARBONATE (HCO3)   | 408. | 6.69  |
| MAGNESIUM (MG) | 73.4  | 6.04  | CARBONATE (CO3)      | 0.   |       |
| SODIUM (NA)    | 96.9  | 4.22  | CHLORIDE (CL)        | 32.3 | 0.91  |
| POTASSIUM (K)  | 1.7   | 0.04  | SULFATE (SO4)        | 155. | 3.23  |
| IRON (FE)      | .020  | 0.00  | NITRATE (AS N)       | 21.5 | 1.53  |
| MANGANESE (MN) | <.001 |       | FLUORIDE (F)         | .58  | 0.03  |
| SILICA (SIO2)  | 9.6   |       | PHOSPHATE TOT (AS P) |      |       |

TOTAL CATIONS 11.98 TOTAL ANIONS 12.39

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) 1.45

|                             |        |                           |        |
|-----------------------------|--------|---------------------------|--------|
| CALCULATED DISSOLVED SOLIDS | 625.69 | TOTAL HARDNESS AS CaCO3   | 386.26 |
| SUM OF DISS. CONSTITUENT    | 832.70 | TOTAL ALKALINITY AS CaCO3 | 334.63 |
| FIELD CONDUCTVY, MICROMHOS  | 1015.  | FIELD ALKALINITY AS CaCO3 | 354.0  |
| LAB CONDUCTVY, MICROMHOS    | 1157.  | RYZNAR STABILITY INDEX    | 6.92   |
| FIELD PH                    | 7.02   | LANGLIER SATURATION INDEX | 0.53   |
| LABORATORY PH               | 7.98   | SODIUM ADSORPTION RATIO   | 2.15   |

| PARAMETER                  | VALUE | PARAMETER                    | VALUE |
|----------------------------|-------|------------------------------|-------|
| FIELD TEMP. WATER          | 8.1 C |                              |       |
| ALUMINUM, DISS (MG/L-AL)   | <.03  | NICKEL, DISS (MG/L AS NI)    | <.01  |
| SILVER, DISS (MG/L AS AG)  | <.002 | LEAD, DISS (MG/L AS PB)      | <.04  |
| BORON, DISS (MG/L AS B)    | .14   | STRONTIUM, DISS (MG/L-SR)    | .59   |
| CADMIUM, DISS (MG/L AS CD) | .002  | TITANIUM, DISS (MG/L AS TI)  | .011  |
| CHROMIUM, DISS (MG/L-CR)   | <.002 | VANADIUM, DISS (MG/L AS V)   | .008  |
| COPPER, DISS (MG/L AS CU)  | .003  | ZINC, DISS (MG/L AS ZN)      | .029  |
| LITHIUM, DISS (MG/L AS LI) | .020  | ZIRCONIUM, DISS (MG/L AS ZR) | <.004 |
| MOLYBDENUM, DISS (MG/L-MO) | <.1   | SELENIUM, DISS (UG/L-SE)     | 8.4   |
| PHOSPHORUS, TOTAL (MG/L-P) | .036  | NITROGEN, KJEL, TO (MG/L-N)  | .2    |
| O-PHOSPHATE, DISS (MG/L-P) | .030  | CARBON, TOT, ORG. (MG/L-C)   | 7.    |

REMARKS: WELL PUMPED @ 7.5 GPM FOR 45 MIN & PRODUCED A DRAWDOWN OF 0.72 FT. \*  
WELL WAS ORIGINALLY A HAND DUG WELL \* PREVIOUS OWNER WAS NELS LARSON \*  
HOMESTEAD NOW OWNED BY GLEN THORSEN \*  
LAB: FU MG OF 75.7 MG/L AND NA OF 99.4 MG/L GIVE .373 SIGMA \*

EXPLANATION: MG/L = MILLIGRAMS PER LITER, UG/L = MICROGRAMS PER LITER, MEQ/L =  
MILLIEQUIVALENTS PER LITER, FT = FEET, MT = METERS, (M) = MEASURED, (E) =  
ESTIMATED, (R) = REPORTED, TR = TOTAL RECOVERABLE, TOT = TOTAL,  
BIO = BIOLOGICALLY AVAILABLE.

OTHER AVAILABLE DATA QW NA S2 WJ OW PW AT OTHER  
OTHER FILE NUMBERS: Y

PROJECT: COST:  
LAST EDIT DATE: 22-MAR-82 BY: TP \*JKS  
PROCESSING PROGRAM: F1730P V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
14.0 50.4 35.2 0.4 8.4 29.8 61.8 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 81Q0959

MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 81Q1568

STATE MONTANA COUNTY CASCADE  
LATITUDE-LONGITUDE 47D35'49"N 111D48'57"W SITE LOCATION 21N 2W 2 0000 01  
UTM COORDINATES 7 N MBMG SITE  
TOPOGRAPHIC MAP FAIRFIELD 15' STATION ID 473549111485701  
GEOLOGIC SOURCE 110TRRC\* \* SAMPLE SOURCE WELL  
DRAINAGE BASIN BD LAND SURFACE ALTITUDE 4018.0 FT < 10  
AGENCY + SAMPLER MBMG\*RAM SUSTAINED YIELD  
BOTTLE NUMBER FR2-18S YIELD MEAS METHOD  
DATE SAMPLED 04-SEP-81 TOTAL DEPTH OF WELL 24.0 FT (M)  
TIME SAMPLED 14:15 HOURS SWL ABOVE(-) OR BELOW GS 15.54 FT (M)  
LAB + ANALYST MBMG\*FNA CASING DIAMETER 6 IN (M)  
DATE ANALYZED 17-NOV-81 CASING TYPE STEEL  
SAMPLE HANDLING 4230 COMPLETION TYPE 12\*  
METHOD SAMPLED PUMPED PERFORATION INTERVAL  
WATER USE DOMESTIC

SAMPLING SITE HOME OF GLEN THORSEN \*  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L  | MEQ/L |                      | MG/L | MEQ/L |
|----------------|-------|-------|----------------------|------|-------|
| CALCIUM (CA)   | 35.8  | 1.79  | BICARBONATE (HCO3)   | 415. | 6.80  |
| MAGNESIUM (MG) | 82.0  | 6.75  | CARBONATE (CO3)      | .0   |       |
| SODIUM (NA)    | 113.  | 4.92  | CHLORIDE (CL)        | 40.0 | 1.13  |
| POTASSIUM (K)  | 2.0   | 0.05  | SULFATE (SO4)        | 217. | 4.52  |
| IRON (FE)      | <.002 |       | NITRATE (AS N)       | 16.0 | 1.14  |
| MANGANESE (MN) | .001  | 0.00  | FLUORIDE (F)         | .74  | 0.04  |
| SILICA (SiO2)  | 9.8   |       | PHOSPHATE TOT (AS P) |      |       |

TOTAL CATIONS 13.50 TOTAL ANIONS 13.63

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) 0.43

|                             |        |                           |        |
|-----------------------------|--------|---------------------------|--------|
| CALCULATED DISSOLVED SOLIDS | 720.77 | TOTAL HARDNESS AS CaCO3   | 426.90 |
| SUM OF DISS. CONSTITUENT    | 931.34 | TOTAL ALKALINITY AS CaCO3 | 340.37 |
| FIELD CONDUCTVY, MICROMHOS  | 1230.  | FIELD ALKALINITY AS CaCO3 | 342.0  |
| LAB CONDUCTVY, MICROMHOS    | 1222.  | RYZNAR STABILITY INDEX    | 6.85   |
| FIELD PH                    | 7.78   | LANGLIER SATURATION INDEX | 0.57   |
| LABORATORY PH               | 7.98   | SODIUM ADSORPTION RATIO   | 2.38   |

| PARAMETER                  | VALUE | PARAMETER                   | VALUE |
|----------------------------|-------|-----------------------------|-------|
| FIELD TEMP. WATER          | 9.5 C |                             |       |
| LITHIUM, DISS (MG/L AS LI) | .048  | DISSOLVD SOLIDS (CALC MG/L) | 721.  |

REMARKS: SEE APRIL ANALYSIS \*

EXPLANATION: MG/L = MILLIGRAMS PER LITER; UC/L = MICROGRAMS PER LITER; MEQ/L = MILLIEQUIVALENTS PER LITER; FT = FEET; MT = METERS. (M) = MEASURED; (E) = ESTIMATED; (R) = REPORTED. TR = TOTAL RECOVERABLE. TOT = TOTAL. BIO = BIOLOGICALLY AVAILABLE.

QW WA S2 WI OW PW AT OTHER

OTHER AVAILABLE DATA  
OTHER FILE NUMBERS:

PROJECT: COST:  
LAST EDIT DATE: 08-FEB-83 BY: TP \*BCS  
PROCESSING PROGRAM: F1730P V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
13.2 50.0 36.4 0.4 9.1 36.3 54.6 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 81Q1568



MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 82R0258

STATE MONTANA COUNTY  
LATITUDE-LONGITUDE 47D35'49"N 111D48'57"W SITE LOCATION 21N 2W 2XDDDD 01  
UTM COORDINATES Z N E MBMG SITE  
TOPOGRAPHIC MAP FAIRFIELD 15' STATION ID 473549111485101  
GEOLOGIC SOURCE 110TRRC\* \* SAMPLE SOURCE WELL  
DRAINAGE BASIN BD LAND SURFACE ALTITUDE 4018. FT < 10  
AGENCY + SAMPLER MBMG\*KRAN SUSTAINED YIELD  
BOTTLE NUMBER FAIR18U YIELD MEAS METHOD  
DATE SAMPLED 13-MAY-82 TOTAL DEPTH OF WELL 24. FT (M)  
TIME SAMPLED 16:30 HOURS SWL ABOVE(-) OR BELOW GS 18.75 FT (M)  
LAB + ANALYST MBMG\*FNA CASING DIAMETER 6 IN (M)  
DATE ANALYZED 10-JUN-82 CASING TYPE STEEL  
SAMPLE HANDLING 4230 COMPLETION TYPE 01\*01  
METHOD SAMPLED PUMPED PERFORATION INTERVAL  
WATER USE DOMESTIC

SAMPLING SITE HOME OF GLEN THORSEN  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L  | MEQ/L |                      | MG/L | MEQ/L |
|----------------|-------|-------|----------------------|------|-------|
| CALCIUM (CA)   | 36.8  | 1.84  | BICARBONATE (HCO3)   | 409. | 6.70  |
| MAGNESIUM (MG) | 82.3  | 6.77  | CARBONATE (CO3)      | .0   |       |
| SODIUM (NA)    | 120.  | 5.22  | CHLORIDE (CL)        | 29.9 | 0.84  |
| POTASSIUM (K)  | 1.9   | 0.05  | SULFATE (SO4)        | 246. | 5.12  |
| IRON (FE)      | <.002 |       | NITRATE (AS N)       | 17.9 | 1.28  |
| MANGANESE (MN) | .001  | 0.00  | FLUORIDE (F)         | .70  | 0.04  |
| SILICA (SIO2)  | 9.2   |       | PHOSPHATE TOT (AS P) |      |       |

TOTAL CATIONS 13.88 TOTAL ANIONS 13.98

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) 0.35

|                             |        |                           |        |
|-----------------------------|--------|---------------------------|--------|
| CALCULATED DISSOLVED SOLIDS | 746.18 | TOTAL HARDNESS AS CaCO3   | 430.64 |
| SUM OF DISS. CONSTITUENT    | 953.70 | TOTAL ALKALINITY AS CaCO3 | 335.45 |
| FIELD CONDUCTVY, MICROMHOS  | 1080.  | FIELD ALKALINITY AS CaCO3 |        |
| LAB CONDUCTVY, MICROMHOS    | 1168.  | RYZNAR STABILITY INDEX    | 7.09   |
| FIELD PH                    | 7.81   | LANGLIER SATURATION INDEX | 0.32   |
| LABORATORY PH               | 7.73   | SODIUM ADSORPTION RATIO   | 2.52   |

| PARAMETER                | VALUE | PARAMETER         | VALUE |
|--------------------------|-------|-------------------|-------|
| FIELD TEMP, AIR          | 70. F | FIELD TEMP, WATER | 8. C  |
| DISSLVD SOLIDS(CALC MG/L | 746.  |                   |       |

REMARKS: SEE JUNE 1981 ANALYSIS FOR CORRELATION

EXPLANATION: MG/L = MILLIGRAMS PER LITER; UG/L = MICROGRAMS PER LITER; MEQ/L = MILLIEQUIVALENTS PER LITER; FT = FEET; MT = METERS; (M) = MEASURED; (E) = ESTIMATED; (R) = REPORTED; TR = TOTAL RECOVERABLE; TOT = TOTAL; BIO = BIOLOGICALLY AVAILABLE.

OTHER AVAILABLE DATA QW WA S2 WJ OW PW AT OTHER  
Y

PROJECT: COST:  
LAST EDIT DATE: 23-SEP-83 BY: TP \*JKS  
PROCESSING PROGRAM: F1730P V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
13.2 48.8 37.6 0.4 6.7 40.4 52.9 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 82R0258

MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 81Q0155

STATE MONTANA COUNTY TETON  
LATITUDE-LONGITUDE 47D35'45"N 111D52'03"W SITE LOCATION 21N 2W 9 BAAA  
UTM COORDINATES Z N E MRMG SITE  
TOPOGRAPHIC MAP FAIRFIELD 15' STATION ID 473545111520301  
GEOLOGIC SOURCE 110TRRC\* \* SAMPLE SOURCE WELL  
DRAINAGE BASIN BD LAND SURFACE ALTITUDE 4054, FT < 1,  
AGENCY + SAMPLER MRMG\*RRAN SUSTAINED YIELD  
BOTTLE NUMBER FAIR 6 YIELD MEAS METHOD  
DATE SAMPLED 04-FEB-81 TOTAL DEPTH OF WELL 20.6 FT (M)  
TIME SAMPLED 10:02 HOURS SWL ABOVE(-) OR BELOW GS 8.12 FT (M)  
LAB + ANALYST MRMG\*FNA CASING DIAMETER 48 IN (M)  
DATE ANALYZED 27-APR-81 CASING TYPE CULVERT  
SAMPLE HANDLING 5330 COMPLETION TYPE 01\*  
METHOD SAMPLED PUMPED PERFORATION INTERVAL  
WATER USE DOMESTIC AND STOCK

SAMPLING SITE HULL, LOUIS \* 5 MI EAST OF FAIRFIELD \*  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L | MEQ/L |                      | MG/L  | MEQ/L |
|----------------|------|-------|----------------------|-------|-------|
| CALCIUM (CA)   | 102. | 5.09  | BICARBONATE (HCO3)   | 388.  | 9.64  |
| MAGNESIUM (MG) | 295. | 23.45 | CARBONATE (CO3)      | 0.    |       |
| SODIUM (NA)    | 432. | 18.79 | CHLORIDE (CL)        | 253.  | 7.14  |
| POTASSIUM (K)  | 9.3  | 0.24  | SULFATE (SO4)        | 1390. | 28.94 |
| IRON (FE)      | .112 | 0.01  | NITRATE (AS N)       | 17.1  | 1.22  |
| MANGANESE (MN) | .001 | 0.00  | FLUORIDE (F)         | .67   | 0.04  |
| SILICA (SIO2)  | 10.2 |       | PHOSPHATE TOT (AS P) |       |       |

TOTAL CATIONS 47.57 TOTAL ANIONS 46.97

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) -0.76

|                             |         |                           |         |
|-----------------------------|---------|---------------------------|---------|
| CALCULATED DISSOLVED SOLIDS | 2789.04 | TOTAL HARDNESS AS CaCO3   | 1427.75 |
| SUM OF DISS. CONSTITUENT    | 3087.38 | TOTAL ALKALINITY AS CaCO3 | 482.26  |
| FIELD CONDUCTVY, MICROMHOS  |         | FIELD ALKALINITY AS CaCO3 | 470.    |
| LAB CONDUCTVY, MICROMHOS    | 3963.   | RYZNAR STABILITY INDEX    | 5.93    |
| FIELD PH                    | 7.26    | LANGLIER SATURATION INDEX | 0.88    |
| LABORATORY PH               | 7.69    | SODIUM ADSORPTION RATIO   | 4.98    |

| PARAMETER                   | VALUE | PARAMETER                   | VALUE |
|-----------------------------|-------|-----------------------------|-------|
| FIELD TEMP. WATER           | 8.0 C |                             |       |
| ALUMINUM, DISS (MG/L-AL)    | <.03  | NICKEL, DISS (MG/L AS NI)   | <.01  |
| SILVER, DISS (MG/L AS AG)   | <.002 | LEAD, DISS (MG/L AS PB)     | <.04  |
| BORON, DISS (MG/L AS B)     | <.002 | STRONTIUM, DISS (MG/L-SR)   | 1.84  |
| CADMIUM, DISS (MG/L AS CD)  | <.002 | TITANIUM DISS (MG/L AS TI)  | .006  |
| COPPER, DISS (MG/L AS CU)   | .010  | VANADIUM, DISS (MG/L AS V)  | .005  |
| LITHIUM, DISS (MG/L AS LI)  | .118  | ZINC, DISS (MG/L AS ZN)     | .016  |
| MOLYBDENUM, DISS (MG/L-MO)  | <.02  | ZIRCONIUM DISS (MG/L AS ZR) | <.004 |
| CHROMIUM, DISS (MG/L-CR)    | <.002 | PHOSPHORUS, TOTAL (MG/L-P)  | .023  |
| O-PHOSPHATE, DISS (MG/L-P)  | .007  | SELENIUM, DISS (UG/L-SE)    | 17.9  |
| NITROGEN, KJEL, TO (MG/L-N) | 2.2   |                             |       |

REMARKS: FORMERLY THE OLD NEAL KEITH PLACE \* WELL LOCATED ADJACENT TO CORRAL \*

EXPLANATION: MG/L = MILLIGRAMS PER LITER, UG/L = MICROGRAMS PER LITER, MEQ/L = MILLIEQUIVALENTS PER LITER, FT = FEET, MT = METERS, (M) = MEASURED, (E) = ESTIMATED, (R) = REPORTED, TR = TOTAL RECOVERABLE, TOT = TOTAL, BIO = BIOLOGICALLY AVAILABLE.

OTHER AVAILABLE DATA QW WA S2 WJ OW PW AT OTHER  
OTHER FILE NUMBERS: Y

PROJECT: COST:  
LAST EDIT DATE: 09-MAR-84 BY: TP \*BCS  
PROCESSING PROGRAM: F1730P V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
10.7 49.3 39.5 0.5 15.6 63.3 21.1 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 81Q0155



MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 82Q0246

STATE MONTANA COUNTY TETON  
LATITUDE-LONGITUDE 47D35'45"N 111D52'12"W SITE LOCATION 21N 2W 09\*BAAA 02  
UTM COORDINATES Z N E MBMG SITE  
TOPOGRAPHIC MAP FAIRFIELD 15' STATION ID 473545111521202  
GEOLOGIC SOURCE 110TRRC\* \* SAMPLE SOURCE WELL  
DRAINAGE BASIN BD LAND SURFACE ALTITUDE 4054.0 FT < 10  
AGENCY + SAMPLER MBMG\*RAM SUSTAINED YIELD  
BOTTLE NUMBER FAIR 6U YIELD MEAS METHOD  
DATE SAMPLED 12-MAY-82 TOTAL DEPTH OF WELL 20.6 FT (M)  
TIME SAMPLED 16:35 HOURS SWL ABOVE(-) OR BELOW GS 8.62 FT (M)  
LAB + ANALYST MBMG\*FNA CASING DIAMETER 48 IN (M)  
DATE ANALYZED 06-JUL-82 CASING TYPE CULVERT  
SAMPLE HANDLING 4230 COMPLETION TYPE 01\*01  
METHOD SAMPLED PUMPED PERFORATION INTERVAL  
WATER USE STOCK

SAMPLING SITE HULL, LOUIS\*APPROX. 5 MI E OF FAIRFIELD  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L | MEQ/L |                      | MG/L | MEQ/L |
|----------------|------|-------|----------------------|------|-------|
| CALCIUM (CA)   | 85.9 | 4.29  | BICARBONATE (HCO3)   | 642. | 10.52 |
| MAGNESIUM (MG) | 236. | 19.41 | CARBONATE (CO3)      | .0   |       |
| SODIUM (NA)    | 395. | 17.18 | CHLORIDE (CL)        | 279. | 7.87  |
| POTASSIUM (K)  | 9.5  | 0.24  | SULFATE (SO4)        | 982. | 20.45 |
| IRON (FE)      | .023 | 0.00  | NITRATE (AS N)       | 22.2 | 1.58  |
| MANGANESE (MN) | .002 | 0.00  | FLUORIDE (F)         | 1.4  | 0.07  |
| SILICA (SIO2)  | 9.8  |       | PHOSPHATE TOT (AS P) |      |       |

TOTAL CATIONS 41.13 TOTAL ANIONS 40.50

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) -0.91

|                             |         |                           |         |
|-----------------------------|---------|---------------------------|---------|
| CALCULATED DISSOLVED SOLIDS | 2337.08 | TOTAL HARDNESS AS CaCO3   | 1185.87 |
| SUM OF DISS. CONSTITUENT    | 2662.82 | TOTAL ALKALINITY AS CaCO3 | 526.55  |
| FIELD CONDUCTVY, MICROMHOS  | 3533.   | FIELD ALKALINITY AS CaCO3 | 562.0   |
| LAB CONDUCTVY, MICROMHOS    | 3298.   | RYZNAR STABILITY INDEX    | 6.23    |
| FIELD PH                    | 7.61    | LANGLIER SATURATION INDEX | 0.62    |
| LABORATORY PH               | 7.46    | SODIUM ADSORPTION RATIO   | 4.99    |

| PARAMETER                  | VALUE  | PARAMETER                   | VALUE |
|----------------------------|--------|-----------------------------|-------|
| FIELD TEMP, AIR            | 19.5 C | FIELD TEMP, WATER           | 6.8 C |
| LITHIUM, DISS (MG/L AS LI) | .10    | DISSOLVD SOLIDS (CALC MG/L) | 2337. |

REMARKS: FORMERLY THE OLD KEITH NEAL PLACE\*HABITANTS HAUL THEIR WATER FOR PORT-  
ABLE CONSUMPTION & FROM RICHARD M. GRAVES WELL.

EXPLANATION: MG/L = MILLIGRAMS PER LITER, UG/L = MICROGRAMS PER LITER, MEQ/L =  
MILLIEQUIVALENTS PER LITER, FT = FEET, MT = METERS, (M) = MEASURED, (E) =  
ESTIMATED, (R) = REPORTED, TR = TOTAL RECOVERABLE, TOT = TOTAL.  
BIO = BIOLOGICALLY AVAILABLE.

OTHER AVAILABLE DATA QW NA S2 WI OW PW AT OTHER  
OTHER FILE NUMBERS: Y Y

PROJECT: COST:  
LAST EDIT DATE: 23-SEP-83 BY: TP \*JKS  
PROCESSING PROGRAM: F1730P V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
10.4 47.2 41.8 0.6 20.3 52.6 27.1 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 82Q0246

MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 81Q0958

STATE MONTANA COUNTY CASCADE  
LATITUDE-LONGITUDE 47D35'14"N 111D51'30"W SITE LOCATION 21N 2W 9 DADA  
UTM COORDINATES Z N E MBMG SITE  
TOPOGRAPHIC MAP FAIRFIELD 15' STATION ID 473514111513001  
GEOLOGIC SOURCE 110TRRC\* \* \* SAMPLE SOURCE WELL  
DRAINAGE BASIN BD LAND SURFACE ALTITUDE 4061, FT < 1.  
AGENCY + SAMPLER MBMG\*KAN SUSTAINED YIELD  
BOTTLE NUMBER FAIR 17 YIELD MEAS METHOD  
DATE SAMPLED 24-JUN-81 TOTAL DEPTH OF WELL  
TIME SAMPLED 11:15 HOURS SWL ABOVE(-) OR BELOW GS 14.82 FT (M)  
LAB + ANALYST MBMG\*FNA CASING DIAMETER 48 IN (M)  
DATE ANALYZED 15-JUL-81 CASING TYPE CULVERT  
SAMPLE HANDLING 5330 COMPLETION TYPE 12\*  
METHOD SAMPLED PUMPED PERFORATION INTERVAL  
WATER USE DOMESTIC AND STOCK

SAMPLING SITE GRAVES, RICHARD M. \*  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L  | MEQ/L |                      | MG/L | MEQ/L |
|----------------|-------|-------|----------------------|------|-------|
| CALCIUM (CA)   | 25.5  | 1.27  | BICARBONATE (HCO3)   | 506. | 8.29  |
| MAGNESIUM (MG) | 51.7  | 4.25  | CARBONATE (CO3)      | 0.   |       |
| SODIUM (NA)    | 168.  | 7.31  | CHLORIDE (CL)        | 10.3 | 0.29  |
| POTASSIUM (K)  | 1.8   | 0.05  | SULFATE (SO4)        | 112. | 2.33  |
| IRON (FE)      | .004  | 0.00  | NITRATE (AS N)       | 23.7 | 1.69  |
| MANGANESE (MN) | <.001 |       | FLUORIDE (F)         | 1.89 | 0.10  |
| SILICA (SiO2)  | 9.2   |       | PHOSPHATE TOT (AS P) |      |       |

TOTAL CATIONS 12.88 TOTAL ANIONS 12.71

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) -0.59

|                               |        |                           |        |
|-------------------------------|--------|---------------------------|--------|
| CALCULATED DISSOLVED SOLIDS   | 453.36 | TOTAL HARDNESS AS CaCO3   | 276.47 |
| SUM OF DISS. CONSTITUENT      | 910.09 | TOTAL ALKALINITY AS CaCO3 | 415.01 |
| FIELD CONDUCTIVITY, MICROMHOS | 1109.  | FIELD ALKALINITY AS CaCO3 | 426.0  |
| LAB CONDUCTIVITY, MICROMHOS   | 1210.  | RYZNAR STABILITY INDEX    | 6.85   |
| FIELD PH                      | 8.00   | LANGLIER SATURATION INDEX | 0.62   |
| LABORATORY PH                 | 8.10   | SODIUM ADSORPTION RATIO   | 4.40   |

| PARAMETER                   | VALUE | PARAMETER                   | VALUE |
|-----------------------------|-------|-----------------------------|-------|
| FIELD TEMP. WATER           | 8.5 C |                             |       |
| PHOSPHORUS, TOTAL (MG/L-P)  | .056  | CHROMIUM, DISS (MG/L-CR)    | <.002 |
| O-PHOSPHATE, DISS (MG/L-P)  | .043  | COPPER, DISS (MG/L AS CU)   | <.002 |
| LITHIUM, DISS (MG/L AS LI)  | .030  | MOLYBDENUM, DISS (MG/L-MO)  | <.1   |
| SELENIUM, DISS (UG/L-SE)    | 14.   | NICKEL, DISS (MG/L AS NI)   | <.01  |
| NITROGEN, KJEL, TO (MG/L-N) | .1    | LEAD, DISS (MG/L AS PB)     | <.04  |
| CARBON, TOT, ORG. (MG/L-C)  | 13.   | STRONTIUM, DISS (MG/L-SR)   | .44   |
| ALUMINUM, DISS (MG/L-AL)    | <.03  | TITANIUM DISS (MG/L AS TI)  | .012  |
| SILVER, DISS (MG/L AS AG)   | <.002 | VANADIUM, DISS (MG/L AS V)  | .002  |
| BORON, DISS (MG/L AS B)     | .33   | ZINC, DISS (MG/L AS ZN)     | .084  |
| CADMIUM, DISS (MG/L AS CD)  | <.002 | ZIRCONIUM DISS (MG/L AS ZR) | <.004 |
| DISSOLVD SOLIDS (CALC MG/L) | 453.  |                             |       |

REMARKS: WELL IS IN SMALL WELL HOUSE ABOUT 100' FROM THE HOUSE ON A HOMESTEAD OWNED BY RICHARD M. GRAVES \*

EXPLANATION: MG/L = MILLIGRAMS PER LITER; UG/L = MICROGRAMS PER LITER; MEQ/L = MILLIEQUIVALENTS PER LITER; FT = FEET; MT = METERS; (M) = MEASURED; (E) = ESTIMATED; (R) = REPORTED; TR = TOTAL RECOVERABLE; TOT = TOTAL; BIO = BIOLOGICALLY AVAILABLE.

QW WA S2 W1 OW PW AT OTHER  
OTHER AVAILABLE DATA  
OTHER FILE NUMBERS:

PROJECT: COST:  
LAST EDIT DATE: 04-FEB-83 BY: TP #BCS  
PROCESSING PROGRAM: F1730P V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
9.9 33.0 56.7 0.4 2.7 21.4 76.0 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 81Q0958



MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 81Q1567

STATE MONTANA COUNTY CASCADE  
LATITUDE-LONGITUDE 47D35'14"N 111D51'30"W SITE LOCATION 21N 2W 9 DATA 01  
UTM COORDINATES Z N E MBMG SITE  
TOPOGRAPHIC MAP FAIRFIELD 15' STATION ID 473514111513001  
GEOLOGIC SOURCE 110TRRC\* \* SAMPLE SOURCE WELL  
DRAINAGE BASIN RD LAND SURFACE ALTITUDE 4061.0 FT < 10  
AGENCY + SAMPLER MBMG\*RRAN SUSTAINED YIELD  
BOTTLE NUMBER FR2-17S YIELD MEAS METHOD  
DATE SAMPLED 04-SEP-81 TOTAL DEPTH OF WELL  
TIME SAMPLED 14:50 HOURS SWL ABOVE(-) OR BELOW GS 14.74 FT (M)  
LAB + ANALYST MBMG\*FNA CASING DIAMETER 48 IN (M)  
DATE ANALYZED 17-NOV-81 COMPLETION TYPE CULVERT  
SAMPLE HANDLING 4230 PERFORATION INTERVAL  
METHOD SAMPLED PUMPED  
WATER USE DOMESTIC

SAMPLING SITE GRAVES, RICHARD M: APP 6 MI ESE OF FAIRFIELD  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L | MEQ/L |                      | MG/L | MEQ/L |
|----------------|------|-------|----------------------|------|-------|
| CALCIUM (CA)   | 24.5 | 1.22  | BICARBONATE (HCO3)   | 507. | 8.31  |
| MAGNESIUM (MG) | 49.6 | 4.08  | CARBONATE (CO3)      | .0   |       |
| SODIUM (NA)    | 167. | 7.26  | CHLORIDE (CL)        | 7.3  | 0.21  |
| POTASSIUM (K)  | 2.5  | 0.06  | SULFATE (SO4)        | 113. | 2.35  |
| IRON (FE)      | .026 | 0.00  | NITRATE (AS N)       | 24.9 | 1.78  |
| MANGANESE (MN) | .001 | 0.00  | FLUORIDE (F)         | 2.26 | 0.12  |
| SILICA (SIO2)  | 10.1 |       | PHOSPHATE TOT (AS P) |      |       |

TOTAL CATIONS 12.63 TOTAL ANIONS 12.76

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) 0.45

|                             |        |                           |        |
|-----------------------------|--------|---------------------------|--------|
| CALCULATED DISSOLVED SOLIDS | 650.94 | TOTAL HARDNESS AS CaCO3   | 265.33 |
| SUM OF DISS. CONSTITUENT    | 908.19 | TOTAL ALKALINITY AS CaCO3 | 415.83 |
| FIELD CONDUCTVY, MICROMHOS  | 1202.  | FIELD ALKALINITY AS CaCO3 | 430.0  |
| LAB CONDUCTVY, MICROMHOS    | 1171.  | RYZNAR STABILITY INDEX    | 6.90   |
| FIELD PH                    | 7.39   | LANGLIER SATURATION INDEX | 0.59   |
| LABORATORY PH               | 8.08   | SODIUM ADSORPTION RATIO   | 4.46   |

| PARAMETER                  | VALUE  | PARAMETER | VALUE |
|----------------------------|--------|-----------|-------|
| FIELD TEMP. WATER          | 11.5 C |           |       |
| LITHIUM, DISS (MG/L AS LI) | .046   |           |       |

REMARKS: WELL IS ABOUT 100' FROM A HOUSE OWNED BY GRAVES, NEXT TO A CORRAL \*

EXPLANATION: MG/L = MILLIGRAMS PER LITER, UG/L = MICROGRAMS PER LITER, MEQ/L = MILLIEQUIVALENTS PER LITER, FT = FEET, MT = METERS, (M) = MEASURED, (E) = ESTIMATED, (R) = REPORTED, TR = TOTAL RECOVERABLE, TOT = TOTAL, BIO = BIOLOGICALLY AVAILABLE.

OTHER AVAILABLE DATA QW WA S2 WJ OW PW AT OTHER  
OTHER FILE NUMBERS:

PROJECT: COST:  
LAST EDIT DATE: 04-DEC-81 BY: TP \*TP  
PROCESSING PROGRAM: F1730P V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
9.7 32.3 57.5 0.5 1.9 21.6 76.5 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 81Q1567

MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 82Q0257

STATE MONTANA COUNTY CASCADE  
LATITUDE-LONGITUDE 47D35'14"N 111D51'30"W SITE LOCATION 21N 2W 9XDADA 01  
UTM COORDINATES Z N E MBMG SITE  
TOPOGRAPHIC MAP FAIRFIELD 15' STATION ID 473514111513001  
GEOLOGIC SOURCE 110TRRC\* \* SAMPLE SOURCE WELL  
DRAINAGE BASIN BD LAND SURFACE ALTITUDE 4061. FT < 10  
AGENCY + SAMPLER MBMG\*LAN SUSTAINED YIELD  
BOTTLE NUMBER FAIR17U YIELD MEAS METHOD  
DATE SAMPLED 12-MAY-82 TOTAL DEPTH OF WELL  
TIME SAMPLED 15:40 HOURS SWL ABOVE(-) OR BELOW GS 15.87 FT (M)  
LAB + ANALYST MBMG\*FNA CASING DIAMETER 48 IN (M)  
DATE ANALYZED 10-JUN-82 CASING TYPE CULVERT  
SAMPLE HANDLING 4230 COMPLETION TYPE 01\*01  
METHOD SAMPLED PUMPED PERFORATION INTERVAL  
WATER USE DOMESTIC

SAMPLING SITE GRAVES, RICHARD M\*APPR 6 M ESE OF FAIRFIELD  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L  | MEQ/L |                      | MG/L | MEQ/L |
|----------------|-------|-------|----------------------|------|-------|
| CALCIUM (CA)   | 24.3  | 1.21  | BICARBONATE (HCO3)   | 516. | 8.46  |
| MAGNESIUM (MG) | 49.1  | 4.04  | CARBONATE (CO3)      | .0   |       |
| SODIUM (NA)    | 167.  | 7.26  | CHLORIDE (CL)        | 7.5  | 0.21  |
| POTASSIUM (K)  | 2.0   | 0.05  | SULFATE (SO4)        | 108. | 2.25  |
| IRON (FE)      | <.002 |       | NITRATE (AS N)       | 24.4 | 1.74  |
| MANGANESE (MN) | <.001 |       | FLUORIDE (F)         | 2.2  | 0.12  |
| SILICA (SIO2)  | 8.7   |       | PHOSPHATE TOT (AS P) |      |       |

TOTAL CATIONS 12.57 TOTAL ANIONS 12.77

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) 0.71

|                             |        |                           |        |
|-----------------------------|--------|---------------------------|--------|
| CALCULATED DISSOLVED SOLIDS | 647.39 | TOTAL HARDNESS AS CaCO3   | 262.77 |
| SUM OF DISS. CONSTITUENT    | 909.20 | TOTAL ALKALINITY AS CaCO3 | 423.21 |
| FIELD CONDUCTVY, MICROMHOS  | 1216.  | FIELD ALKALINITY AS CaCO3 | 428.0  |
| LAB CONDUCTVY, MICROMHOS    | 1114.  | RYZNAR STABILITY INDEX    | 7.15   |
| FIELD PH                    | 7.90   | LANGLIER SATURATION INDEX | 0.34   |
| LABORATORY PH               | 7.83   | SODIUM ADSORPTION RATIO   | 4.48   |

| PARAMETER                 | VALUE  | PARAMETER         | VALUE |
|---------------------------|--------|-------------------|-------|
| FIELD TEMP, AIR           | 19.5 C | FIELD TEMP, WATER | 7.3 C |
| DISSOLVD SOLIDS(CALC MG/L | 647.   |                   |       |

REMARKS: WELL IS ABOUT 100 FT FROM A HOUSE OWNED BY GRAVES\* NEXT TO A CORRAL

EXPLANATION: MG/L = MILLIGRAMS PER LITER; UG/L = MICROGRAMS PER LITER; MEQ/L = MILLIEQUIVALENTS PER LITER. FT = FEET; MT = METERS. (M) = MEASURED; (E) = ESTIMATED; (R) = REPORTED. TR = TOTAL RECOVERABLE. TOT = TOTAL. BIO = BIOLOGICALLY AVAILABLE.

OTHER AVAILABLE DATA QW WA S2 WI OW PW AT OTHER  
Y

PROJECT: COST:  
LAST EDIT DATE: 23-SEP-83 BY: TP \*JKS  
PROCESSING PROGRAM: F1730P V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
9.6 32.1 57.8 0.4 1.9 20.6 77.5 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 82Q0257



MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)493-4101

WATER QUALITY ANALYSIS  
LAB NO. 81Q0150

STATE MONTANA COUNTY TETON  
LATITUDE-LONGITUDE 47D36'39"N 111D58'35"W SITE LOCATION 21N 3W 3 BAAA  
UTM COORDINATES Z N E MEMG SITE  
TOPOGRAPHIC MAP FAIRFIELD 15' STATION ID 473639111583501  
GEOLOGIC SOURCE 110TRRC\* \* SAMPLE SOURCE WELL  
DRAINAGE BASIN BD LAND SURFACE ALTITUDE 3979 FT < 1.  
AGENCY + SAMPLER MBMG\*RAM SUSTAINED YIELD 72 GPM  
BOTTLE NUMBER FAIR 1 YIELD MEAS METHOD REPORTED  
DATE SAMPLED 01-APR-81 TOTAL DEPTH OF WELL 32.0 FT (M)  
TIME SAMPLED 13:15 HOURS SWL ABOVE(-) OR BELOW GS 12.40 FT (M)  
LAB + ANALYST MBMG\*FNA CASING DIAMETER 16 IN (M)  
DATE ANALYZED 27-APR-81 CASING TYPE STEEL  
SAMPLE HANDLING 5330 COMPLETION TYPE 12\*  
METHOD SAMPLED PUMPED PERFORATION INTERVAL 10 TO 32 FT (R)  
WATER USE PUBLIC SUPPLY

SAMPLING SITE CITY OF FAIRFIELD \*  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L  | MEQ/L |                      | MG/L | MEQ/L |
|----------------|-------|-------|----------------------|------|-------|
| CALCIUM (CA)   | 31.6  | 1.58  | BICARBONATE (HCO3)   | 316. | 5.18  |
| MAGNESIUM (MG) | 42.3  | 3.48  | CARBONATE (CO3)      | 0.   |       |
| SODIUM (NA)    | 15.4  | 0.67  | CHLORIDE (CL)        | 1.4  | 0.04  |
| POTASSIUM (K)  | .5    | 0.01  | SULFATE (SO4)        | 27.4 | 0.57  |
| IRON (FE)      | .040  | 0.00  | NITRATE (AS N)       | 1.24 | 0.09  |
| MANGANESE (MN) | <.001 |       | FLUORIDE (F)         | .61  | 0.03  |
| SILICA (SIO2)  | 10.4  |       | PHOSPHATE TOT (AS P) |      |       |

TOTAL CATIONS 5.74 TOTAL ANIONS 5.91

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) 0.88

|                             |        |                           |        |
|-----------------------------|--------|---------------------------|--------|
| CALCULATED DISSOLVED SOLIDS | 286.55 | TOTAL HARDNESS AS CaCO3   | 253.01 |
| SUM OF DISS. CONSTITUENT    | 446.89 | TOTAL ALKALINITY AS CaCO3 | 259.17 |
| FIELD CONDUCTVY, MICROMHOS  |        | FIELD ALKALINITY AS CaCO3 | 266.0  |
| LAB CONDUCTVY, MICROMHOS    | 549.7  | RYZMAR STABILITY INDEX    | 7.27   |
| FIELD PH                    | 7.33   | LANGLIER SATURATION INDEX | 0.31   |
| LABORATORY PH               | 7.90   | SODIUM ADSORPTION RATIO   | 0.42   |

| PARAMETER                   | VALUE | PARAMETER                    | VALUE |
|-----------------------------|-------|------------------------------|-------|
| FIELD TEMP. WATER           | 8.8 C |                              |       |
| ALUMINUM, DISS (MG/L-AL)    | <.03  | NICKEL, DISS (MG/L AS NI)    | <.01  |
| SILVER, DISS (MG/L AS AG)   | <.002 | LEAD, DISS (MG/L AS PB)      | <.04  |
| BORON, DISS (MG/L AS B)     | <.02  | STRONTIUM, DISS (MG/L-SR)    | .679  |
| CADMIUM, DISS (MG/L AS CD)  | <.002 | TITANIUM, DISS (MG/L AS TI)  | <.001 |
| COPPER, DISS (MG/L AS CU)   | <.002 | VANADIUM, DISS (MG/L AS V)   | <.001 |
| LITHIUM, DISS (MG/L AS LI)  | .014  | ZINC, DISS (MG/L AS ZN)      | .004  |
| MOLYBDENUM, DISS (MG/L-MO)  | .02   | ZIRCONIUM, DISS (MG/L AS ZR) | <.004 |
| PHOSPHORUS, TOTAL (MG/L-P)  | <.003 | O-PHOSPHATE, DISS (MG/L-P)   | <.003 |
| SELENIUM, DISS (UG/L-SE)    | .6    | CHROMIUM, DISS (MG/L-CR)     | <.002 |
| NITROGEN, KJEL, TO (MG/L-N) | <.1   | DISSOLVD SOLIDS (CALC MG/L)  | 287.  |

REMARKS: CONTACT LEO MUELLER - TOWN SUPT \*

EXPLANATION: MG/L = MILLIGRAMS PER LITER, UG/L = MICROGRAMS PER LITER, MEQ/L = MILLIEQUIVALENTS PER LITER, FT = FEET, MT = METERS, (M) = MEASURED, (E) = ESTIMATED, (R) = REPORTED, TR = TOTAL RECOVERABLE, TOT = TOTAL, BIO = BIOLOGICALLY AVAILABLE.

OTHER AVAILABLE DATA QW WA S2 W1 OW PW AT OTHER  
OTHER FILE NUMBERS: Y

PROJECT: COST:  
LAST EDIT DATE: 09-MAR-84 BY: TP \*BCS  
PROCESSING PROGRAM: F1730P V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
27.5 40.6 11.7 0.2 0.7 9.9 89.5 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 81Q0150

MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 81Q1552

STATE MONTANA COUNTY TETON  
LATITUDE-LONGITUDE 47D36'39"N 111D20'11"W SITE LOCATION 21N 3W 3 BAAA  
UTM COORDINATES Z N MBMG SITE  
TOPOGRAPHIC MAP FAIRFIELD 15' STATION ID 473639111201101  
GEOLOGIC SOURCE 110TRRC\* \* SAMPLE SOURCE WELL  
DRAINAGE BASIN BD LAND SURFACE ALTITUDE 3979. FT < 10  
AGENCY + SAMPLER MBMG\*AN SUSTAINED YIELD  
BOTTLE NUMBER FR#2-1S YIELD MEAS METHOD  
DATE SAMPLED 02-SEP-81 TOTAL DEPTH OF WELL 32.0 FT (M)  
TIME SAMPLED 15:10 HOURS SWL ABOVE(-) OR BELOW GS 8.91 FT (M)  
LAB + ANALYST MBMG\*FNA CASING DIAMETER 16 IN (M)  
DATE ANALYZED 12-OCT-81 CASING TYPE STEEL  
SAMPLE HANDLING 4230 COMPLETION TYPE 12\*  
METHOD SAMPLED PUMPED PERFORATION INTERVAL 10 TO 32 FT  
WATER USE PUBLIC SUPPLY

SAMPLING SITE CITY OF FAIRFIELD \* WELL #3 \*  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                                                    | MG/L  | MEQ/L |                      | MG/L | MEQ/L |
|----------------------------------------------------|-------|-------|----------------------|------|-------|
| CALCIUM (CA)                                       | 37.8  | 1.89  | BICARBONATE (HCO3)   | 361. | 5.92  |
| MAGNESIUM (MG)                                     | 50.8  | 4.18  | CARBONATE (CO3)      | 0.   |       |
| SODIUM (NA)                                        | 17.2  | 0.75  | CHLORIDE (CL)        | 3.5  | 0.10  |
| POTASSIUM (K)                                      | .5    | 0.01  | SULFATE (SO4)        | 26.8 | 0.56  |
| IRON (FE)                                          | <.002 |       | NITRATE (AS N)       | 2.91 | 0.21  |
| MANGANESE (MN)                                     | <.001 |       | FLUORIDE (F)         | .57  | 0.03  |
| SILICA (SIO2)                                      | 11.6  |       | PHOSPHATE TOT (AS P) |      |       |
| TOTAL CATIONS                                      |       | 6.83  | TOTAL ANIONS         |      | 6.81  |
| STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) |       |       | -0.08                |      |       |

|                             | LABORATORY PH | 8.09 | TOTAL HARDNESS AS CaCO3   | 303.48 |
|-----------------------------|---------------|------|---------------------------|--------|
| FIELD WATER TEMPERATURE     | 12.0 C        |      | TOTAL ALKALINITY AS CaCO3 | 296.08 |
| CALCULATED DISSOLVED SOLIDS | 329.51        |      | SODIUM ADSORPTION RATIO   | 0.43   |
| SUM OF DISS. CONSTITUENT    | 512.68        |      | RYZNAR STABILITY INDEX    | 6.81   |
| SPEC.COND.(MICROMHOS/CM)    | 574.7         |      | LANGLIER SATURATION INDEX | 0.64   |

| PARAMETER                 | VALUE | PARAMETER                | VALUE |
|---------------------------|-------|--------------------------|-------|
| INDUCTVY, FIELD MICROMHOS | 568.  | FIELD PH                 | 7.2   |
| ALKALINITY, FLD(AS CaCO3) | 320.0 | DISSLVD SOLIDS(CALC MG/L | 330.  |
| LITHIUM, DISS(MG/L AS LI) | .022  |                          |       |

REMARKS: CONTACT LEO MUELLER - TOWN SUPT. \* WELL RUNS AT 135 GPM \*

EXPLANATION: MG/L = MILLIGRAMS PER LITER, UG/L = MICROGRAMS PER LITER, MEQ/L = MILLIEQUIVALENTS PER LITER. FT = FEET, MT = METERS. (M) = MEASURED, (E) = ESTIMATED, (R) = REPORTED. TR = TOTAL RECOVERABLE. TOT = TOTAL.

OTHER AVAILABLE DATA QW WA S2 WI OW PW AT OTHER  
OTHER FILE NUMBERS: Y

PROJECT: COST:  
LAST EDIT DATE: 04-FEB-83 BY: TP \*BCS  
PROCESSING PROGRAM: F173OP V2 (11/3/81) PRINTED: 05-MAY-83

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
27.6 61.2 11.0 0.2 1.5 8.5 90.0 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 81Q1552



MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 82Q0154

STATE MONTANA COUNTY TETON  
LATITUDE-LONGITUDE 47D36'39"N 111D20'11"W SITE LOCATION 21N 03W 03\*8AAA  
UTM COORDINATES Z N E MBMG SITE  
TOPOGRAPHIC MAP FAIRFIELD 15' STATION ID 473639111201101  
GEOLOGIC SOURCE 110TRRC\* \* SAMPLE SOURCE WELL  
DRAINAGE BASIN BD LAND SURFACE ALTITUDE 3979.0 FT < 1.  
AGENCY + SAMPLER MBMG\*RAM SUSTAINED YIELD 72.0 GPM  
BOTTLE NUMBER FAIR 1U YIELD MEAS METHOD REPORTED  
DATE SAMPLED 02-APR-82 TOTAL DEPTH OF WELL 32.0 FT (M)  
TIME SAMPLED 13:45 HOURS SWL ABOVE(-) OR BELOW GS 13.07 FT (M)  
LAB + ANALYST MBMG\*FNA CASING DIAMETER 16 IN (M)  
DATE ANALYZED 16-APR-82 CASING TYPE STEEL  
SAMPLE HANDLING 4330 COMPLETION TYPE 12\*  
METHOD SAMPLED PUMPED PERFORATION INTERVAL 10 TO 32 FT (R)  
WATER USE PUBLIC SUPPLY

SAMPLING SITE CITY OF FAIRFIELD'S #3 WELL  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L  | MEQ/L |                      | MG/L | MEQ/L |
|----------------|-------|-------|----------------------|------|-------|
| CALCIUM (CA)   | 32.2  | 1.61  | BICARBONATE (HCO3)   | 316. | 5.18  |
| MAGNESIUM (MG) | 43.8  | 3.60  | CARBONATE (CO3)      | .0   |       |
| SODIUM (NA)    | 15.3  | 0.67  | CHLORIDE (CL)        | 1.3  | 0.04  |
| POTASSIUM (K)  | .4    | 0.01  | SULFATE (SO4)        | 29.8 | 0.62  |
| IRON (FE)      | .002  | 0.00  | NITRATE (AS N)       | 1.74 | 0.12  |
| MANGANESE (MN) | <.001 |       | FLUORIDE (F)         | .59  | 0.03  |
| SILICA (SiO2)  | 9.9   |       | PHOSPHATE TOT (AS P) |      |       |

TOTAL CATIONS 5.89 TOTAL ANIONS 5.99

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) 0.55

|                             |        |                           |        |
|-----------------------------|--------|---------------------------|--------|
| CALCULATED DISSOLVED SOLIDS | 290.70 | TOTAL HARDNESS AS CaCO3   | 260.68 |
| SUM OF DISS. CONSTITUENT    | 451.03 | TOTAL ALKALINITY AS CaCO3 | 259.17 |
| FIELD CONDUCTVY, MICROMHOS  | 518.   | FIELD ALKALINITY AS CaCO3 | 290.0  |
| LAB CONDUCTVY, MICROMHOS    | 568.9  | RYZNAR STABILITY INDEX    | 7.90   |
| FIELD PH                    | 7.30   | LANGLIER SATURATION INDEX | -0.32  |
| LABORATORY PH               | 7.26   | SODIUM ADSORPTION RATIO   | 0.41   |

| PARAMETER                  | VALUE | PARAMETER                   | VALUE |
|----------------------------|-------|-----------------------------|-------|
| FIELD TEMP. AIR            | 1.0 C | FIELD TEMP. WATER           | 7.0 C |
| LITHIUM, DISS (MG/L AS LI) | .017  | DISSOLVD SOLIDS (CALC MG/L) | 291.  |

REMARKS: CONTACT LEO MUELLER - TOWN SUPT. IN CORRESPONDANCE\* PUMPING DURING MEASUREMENTS

EXPLANATION: MG/L = MILLIGRAMS PER LITER; UC/L = MICROGRAMS PER LITER; MEQ/L = MILLIEQUIVALENTS PER LITER; FT = FEET; MT = METERS; (M) = MEASURED; (E) = ESTIMATED; (R) = REPORTED; TR = TOTAL RECOVERABLE; TOT = TOTAL; BIO = BIOLOGICALLY AVAILABLE.

|                      | QW      | WA | S2 | WI      | OW | PW | AT | OTHER |
|----------------------|---------|----|----|---------|----|----|----|-------|
| OTHER AVAILABLE DATA | Y       | Y  |    |         |    |    |    |       |
| OTHER FILE NUMBERS:  | 81Q1552 |    |    | 81Q0150 |    |    |    |       |

PROJECT: COST:  
LAST EDIT DATE: 23-SEP-83 BY: TP \*JKS  
PROCESSING PROGRAM: F1730P V3 (09/1/83) PRINTED: 30-AUG-84

| PERCENT MEQ/L (FOR PIPER PLOT) |      |      |     |     |      |      |     |
|--------------------------------|------|------|-----|-----|------|------|-----|
| CA                             | MG   | NA   | K   | CL  | SO4  | HCO3 | CO3 |
| 27.3                           | 61.2 | 11.3 | 0.2 | 0.6 | 10.6 | 88.7 | 0.0 |

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 82Q0154

MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 81Q1557

|                    |                        |                          |                  |
|--------------------|------------------------|--------------------------|------------------|
| STATE              | MONTANA                | COUNTY                   | TETON            |
| LATITUDE=LONGITUDE | 47D35'45"N 111D52'03"W | SITE LOCATION            | 21N 2W 9 BAAA 01 |
| UTM COORDINATES    | Z N E                  | MBMG SITE                |                  |
| TOPOGRAPHIC MAP    | FAIRFIELD 15'          | STATION ID               | 473545111521202  |
| GEOLOGIC SOURCE    | 110TRRC*               | * SAMPLE SOURCE          | WELL             |
| DRAINAGE BASIN     | BD                     | LAND SURFACE ALTITUDE    | 4054.0 FT < 10   |
| AGENCY + SAMPLER   | MBMG*FNA               | SUSTAINED YIELD          |                  |
| BOTTLE NUMBER      | FR#2-6S                | YIELD MEAS METHOD        |                  |
| DATE SAMPLED       | 03-SEP-81              | TOTAL DEPTH OF WELL      | 20.6 FT (M)      |
| TIME SAMPLED       | 16:45 HOURS            | SWL ABOVE(-) OR BELOW GS | 9.77 FT (M)      |
| LAB + ANALYST      | MBMG*FNA               | CASING DIAMETER          | 48 IN (M)        |
| DATE ANALYZED      | 13-OCT-81              | CASING TYPE              | CULVERT          |
| SAMPLE HANDLING    | 4230                   | COMPLETION TYPE          | 01*              |
| METHOD SAMPLED     | PUMPED                 | PERFORATION INTERVAL     |                  |
| WATER USE          | STOCK                  |                          |                  |

SAMPLING SITE HULL, LOUIS: APPR 5 MI E OF FAIRFIELD \*  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L | MEQ/L |                      | MG/L  | MEQ/L |
|----------------|------|-------|----------------------|-------|-------|
| CALCIUM (CA)   | 96.3 | 4.81  | BICARBONATE (HCO3)   | 677.  | 11.10 |
| MAGNESIUM (MG) | 249. | 20.48 | CARBONATE (CO3)      | 0.    |       |
| SODIUM (NA)    | 407. | 17.70 | CHLORIDE (CL)        | 279.  | 7.87  |
| POTASSIUM (K)  | 12.9 | 0.33  | SULFATE (SO4)        | 1060. | 22.07 |
| IRON (FE)      | .052 | 0.00  | NITRATE (AS N)       | 30.6  | 2.18  |
| MANGANESE (MN) | .004 | 0.00  | FLUORIDE (F)         | 1.21  | 0.06  |
| SILICA (SiO2)  | 11.9 |       | PHOSPHATE TOT (AS P) |       |       |

TOTAL CATIONS 43.33 TOTAL ANIONS 43.28

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) -0.06

|                             |         |                           |         |
|-----------------------------|---------|---------------------------|---------|
| CALCULATED DISSOLVED SOLIDS | 2481.46 | TOTAL HARDNESS AS CaCO3   | 1265.35 |
| SUM OF DISS. CONSTITUENT    | 2824.97 | TOTAL ALKALINITY AS CaCO3 | 555.26  |
| FIELD CNDUCTVY, MICROMHOS   | 3477.   | FIELD ALKALINITY AS CaCO3 | 562.0   |
| LAB CNDUCTVY, MICROMHOS     | 3232.   | RYZNAR STABILITY INDEX    | 5.62    |
| FIELD PH                    | 7.3     | LANGLIER SATURATION INDEX | 1.15    |
| LABORATORY PH               | 7.92    | SODIUM ADSORPTION RATIO   | 4.98    |

| PARAMETER                  | VALUE  | PARAMETER                   | VALUE |
|----------------------------|--------|-----------------------------|-------|
| FIELD TEMP. WATER          | 13.0 C |                             |       |
| LITHIUM, DISS (MG/L AS LI) | .14    | DISSOLVD SOLIDS (CALC MG/L) | 2481. |

REMARKS: FORMERLY THE OLD KEITH NEAL PLACE \* HABITANTS HAUL THEIR WATER FOR POTABLE CONSUMPTION FROM RICHARD M. GRAVES WELL \*

EXPLANATION: MG/L = MILLIGRAMS PER LITER, UG/L = MICROGRAMS PER LITER, MEQ/L = MILLIEQUIVALENTS PER LITER, FT = FEET, MT = METERS, (M) = MEASURED, (E) = ESTIMATED, (R) = REPORTED, TR = TOTAL RECOVERABLE, TOT = TOTAL, BIO = BIOLOGICALLY AVAILABLE.

OTHER AVAILABLE DATA QW WA S2 WI OW PW AT OTHER  
OTHER FILE NUMBERS: Y

PROJECT: COST:  
LAST EDIT DATE: 04-FEB-83 BY: TP \*BCS  
PROCESSING PROGRAM: F1730P V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
11.1 47.3 40.9 0.8 19.2 53.8 27.0 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 81Q1557



MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 81Q0159

STATE MONTANA COUNTY TETON  
LATITUDE-LONGITUDE 47D41'02"N 111D44'46"W SITE LOCATION 22N 1W 4 DDCD  
UTM COORDINATES Z12 N 5081 E MBMG SITE  
TOPOGRAPHIC MAP VAUGHN 15' STATION ID 474102111444601  
GEOLOGIC SOURCE 110TRRC\* \* \* SAMPLE SOURCE WELL  
DRAINAGE BASIN BD LAND SURFACE ALTITUDE 3738.0 FT < 1.  
AGENCY + SAMPLER MBMG\*FNA SUSTAINED YIELD 20. GPM  
BOTTLE NUMBER FAIR 10 YIELD MEAS METHOD REPORTED  
DATE SAMPLED 02-APR-81 TOTAL DEPTH OF WELL 19.0 FT (M)  
TIME SAMPLED 15:36 HOURS SWL ABOVE(-) OR BELOW GS 16.14 FT (M)  
LAB + ANALYST MBMG\*FNA CASING DIAMETER 6 IN (M)  
DATE ANALYZED 13-MAY-81 CASING TYPE STEEL  
SAMPLE HANDLING 5330 COMPLETION TYPE 01%  
METHOD SAMPLED PUMPED PERFORATION INTERVAL  
WATER USE DOMESTIC

SAMPLING SITE GETTEL, ARNOLD \* APPROX 3 MI SW OF POWER \*  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L | MEQ/L |                      | MG/L | MEQ/L |
|----------------|------|-------|----------------------|------|-------|
| CALCIUM (CA)   | 49.0 | 2.45  | BICARBONATE (HCO3)   | 470. | 7.70  |
| MAGNESIUM (MG) | 83.0 | 6.83  | CARBONATE (CO3)      | .0   |       |
| SODIUM (NA)    | 82.3 | 3.58  | CHLORIDE (CL)        | 10.0 | 0.28  |
| POTASSIUM (K)  | 1.0  | 0.03  | SULFATE (SO4)        | 228. | 4.75  |
| IRON (FE)      | .051 | 0.00  | NITRATE (AS N)       | 3.57 | 0.25  |
| MANGANESE (MN) | .004 | 0.00  | FLUORIDE (F)         | 1.49 | 0.08  |
| SILICA (SIO2)  | 12.5 |       | PHOSPHATE TOT (AS P) |      |       |

TOTAL CATIONS 12.88 TOTAL ANIONS 13.07

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) 0.62

|                                | LABORATORY PH | 7.56 | TOTAL HARDNESS AS CaCO3   | 463.98 |
|--------------------------------|---------------|------|---------------------------|--------|
| FIELD WATER TEMPERATURE        | 8.2           |      | TOTAL ALKALINITY AS CaCO3 | 385.48 |
| CALCULATED DISSOLVED SOLIDS    | 702.44        |      | SODIUM ADSORPTION RATIO   | 1.66   |
| SUM OF DISS. CONSTITUENT       | 940.92        |      | RYZNAR STABILITY INDEX    | 6.89   |
| LAB SPEC. COND. (MICROMHOS/CM) | 1170.         |      | LANGLIER SATURATION INDEX | 0.34   |

| PARAMETER                  | VALUE | PARAMETER                  | VALUE |
|----------------------------|-------|----------------------------|-------|
| COND. FIELD MICROMHOS      | 1082. | FIELD PH                   | 7.11  |
| ALKALINITY, FLD (AS CaCO3) | 20.8  | ALUMINUM, DISS (MG/L-AL)   | <.03  |
| ICKEL, DISS (MG/L AS NI)   | <.01  | SILVER, DISS (MG/L AS AG)  | <.002 |
| EAD, DISS (MG/L AS PB)     | <.04  | BORON, DISS (MG/L AS B)    | <.02  |
| TRONTIUM, DISS (MG/L-SR)   | .65   | CADMIUM, DISS (MG/L AS CD) | <.002 |
| ITANIUM DIS (MG/L AS TI)   | .005  | CHROMIUM, DISS (MG/L-CR)   | <.002 |
| ANADIUM, DISS (MG/L AS V)  | <.001 | COPPER, DISS (MG/L AS CU)  | .013  |
| INC, DISS (MG/L AS ZN)     | .016  | LITHIUM, DISS (MG/L AS LI) | .057  |
| IRCONIUM DIS (MG/L AS ZR)  | <.004 | MOLYBDENUM, DISS (MG/L-MO) | <.02  |
| ELENIUM, DISS (UG/L-SE)    | 7.2   | PHOSPHORUS, TOTAL (MG/L-P) | .007  |
| ITROGEN, KJEL, TO (MG/L-N) | <.1   | O-PHOSPHATE, DISS (MG/L-P) | <.003 |

EMARKS: OWNER: ARNOLD GETTEL \*

XPLANATION: MG/L = MILLIGRAMS PER LITER; UG/L = MICROGRAMS PER LITER; MEQ/L = MILLIEQUIVALENTS PER LITER. FT = FEET, MT = METERS. (M) = MEASURED; (E) = ESTIMATED; (R) = REPORTED. TR = TOTAL RECOVERABLE. TOT = TOTAL.

OTHER AVAILABLE DATA: QW WA S2 WI OW PW AT OTHER  
Y

PROJECT: COST:  
LAST EDIT DATE: 27-MAY-81 BY: TP \*MJT  
PROCESSING PROGRAM: F1730P V2 (11/3/81) PRINTED: 05-MAY-83

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
19.0 53.0 27.8 0.2 2.2 37.3 60.5 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 81Q0159

MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 81Q1561

STATE MONTANA COUNTY TETON  
LATITUDE-LONGITUDE 47D41'02"N 111D43'58"W SITE LOCATION 22N 1W 4 DDCD 01  
UTM COORDINATES Z N E MBMG SITE  
TOPOGRAPHIC MAP VAUGHN 15' STATION ID 474102111435801  
GEOLOGIC SOURCE 110TRRC\* \* \* SAMPLE SOURCE WELL  
DRAINAGE BASIN BD LAND SURFACE ALTITUDE 3738.0 FT < 10  
AGENCY + SAMPLER MBMG\*LAN SUSTAINED YIELD  
BOTTLE NUMBER FR2-10S YIELD MEAS METHOD  
DATE SAMPLED 03-SEP-81 TOTAL DEPTH OF WELL 19.0 FT (M)  
TIME SAMPLED 09:20 HOURS SWL ABOVE(-) OR BELOW GS 14.98 FT (M)  
LAB + ANALYST MBMG\*FNA CASING DIAMETER 6 IN (M)  
DATE ANALYZED 15-OCT-81 CASING TYPE STEEL  
SAMPLE HANDLING 4230 COMPLETION TYPE 01\*  
METHOD SAMPLED PUMPED PERFORATION INTERVAL  
WATER USE DOMESTIC

SAMPLING SITE GETTEL, ARNOLD: APPROX 3 MI SW OF POWER \*  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L  | MEQ/L |                      | MG/L | MEQ/L |
|----------------|-------|-------|----------------------|------|-------|
| CALCIUM (CA)   | 52.4  | 2.61  | BICARBONATE (HCO3)   | 564. | 9.24  |
| MAGNESIUM (MG) | 98.1  | 8.07  | CARBONATE (CO3)      | 0.   |       |
| SODIUM (NA)    | 93.9  | 4.08  | CHLORIDE (CL)        | 11.6 | 0.33  |
| POTASSIUM (K)  | 1.5   | 0.04  | SULFATE (SO4)        | 259. | 5.39  |
| IRON (FE)      | .011  | 0.00  | NITRATE (AS N)       | 3.48 | 0.25  |
| MANGANESE (MN) | <.001 |       | FLUORIDE (F)         | 1.57 | 0.08  |
| SILICA (SIO2)  | 12.3  |       | PHOSPHATE TOT (AS P) |      |       |

TOTAL CATIONS 14.81 TOTAL ANIONS 15.29

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) 1.49

|                             | VALUE   |                           | VALUE  |
|-----------------------------|---------|---------------------------|--------|
| LABORATORY PH               | 7.89    | TOTAL HARDNESS AS CaCO3   | 534.62 |
| FIELD WATER TEMPERATURE     | 12.0 C  | TOTAL ALKALINITY AS CaCO3 | 462.58 |
| CALCULATED DISSOLVED SOLIDS | 811.69  | SODIUM ADSORPTION RATIO   | 1.77   |
| SUM OF DISS. CONSTITUENT    | 1097.86 | RYZNAR STABILITY INDEX    | 6.34   |
| SPEC.COND.(MICROMHOS/CM)    | 1306.   | LANGLIER SATURATION INDEX | 0.77   |

| PARAMETER                 | VALUE | PARAMETER                 | VALUE |
|---------------------------|-------|---------------------------|-------|
| INDUCTVY, FIELD MICROMHOS | 1288. | FIELD PH                  | 6.75  |
| ALKALINITY, FLD(AS CaCO3) | 470.0 | DISSLVD SOLIDS(CALC MG/L) | 812.  |
| LITHIUM, DISS(MG/L AS LI) | .071  |                           |       |

LAB: FU CA 54.1, MG 103, NA 97.8 MG/L GIVE -.7 SIGMA & 15.5 TOT CATION MEQV/L

EXPLANATION: MG/L = MILLIGRAMS PER LITER, UG/L = MICROGRAMS PER LITER, MEQ/L = MILLIEQUIVALENTS PER LITER. FT = FEET, MT = METERS. (M) = MEASURED, (E) = ESTIMATED, (R) = REPORTED. TR = TOTAL RECOVERABLE. TOT = TOTAL.

OTHER AVAILABLE DATA QW WA S2 W1 OW PW AT OTHER  
OTHER FILE NUMBERS: Y

PROJECT: COST:  
LAST EDIT DATE: 04-FEB-83 BY: TP \*BCS  
PROCESSING PROGRAM: F1730P V2 (11/3/81) PRINTED: 05-MAY-83

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
17.7 54.5 27.6 0.3 2.2 36.0 61.8 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 81Q1561



MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 82Q0250

STATE MONTANA COUNTY TETON  
LATITUDE-LONGITUDE 47°41'02"N 111°43'58"W SITE LOCATION 22N 1W 4\*DDCD 01  
UTM COORDINATES Z N E MBMG SITE  
TOPOGRAPHIC MAP VAUGHN 15' STATION ID 474102111435801  
GEOLOGIC SOURCE 110TRRC\* \* SAMPLE SOURCE WELL  
DRAINAGE BASIN BD LAND SURFACE ALTITUDE 3738.0 FT < 10  
AGENCY + SAMPLER MBMG\*RAM SUSTAINED YIELD  
BOTTLE NUMBER FAIR10U YIELD MEAS METHOD  
DATE SAMPLED 11-MAY-82 TOTAL DEPTH OF WELL 19.0 FT (M)  
TIME SAMPLED 18:00 HOURS SWL ABOVE(-) OR BELOW GS 16.35 FT (M)  
LAB + ANALYST MBMG\*FNA CASING DIAMETER 6 IN (M)  
DATE ANALYZED 10-JUN-82 CASING TYPE STEEL  
SAMPLE HANDLING 4230 COMPLETION TYPE 01\*  
METHOD SAMPLED PUMPED PERFORATION INTERVAL  
WATER USE DOMESTIC

SAMPLING SITE GETTEL ARNOLD\*APPROX. 3 MI SW OF POWER  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L | MEQ/L |                      | MG/L | MEQ/L |
|----------------|------|-------|----------------------|------|-------|
| CALCIUM (CA)   | 52.3 | 2.61  | BICARBONATE (HCO3)   | 531. | 8.70  |
| MAGNESIUM (MG) | 91.8 | 7.55  | CARBONATE (CO3)      | .0   |       |
| SODIUM (NA)    | 86.1 | 3.75  | CHLORIDE (CL)        | 9.9  | 0.28  |
| POTASSIUM (K)  | 1.3  | 0.03  | SULFATE (SO4)        | 216. | 4.50  |
| IRON (FE)      | .017 | 0.00  | NITRATE (AS N)       | 3.34 | 0.24  |
| MANGANESE (MN) | .002 | 0.00  | FLUORIDE (F)         | 1.5  | 0.08  |
| SILICA (SIO2)  | 11.8 |       | PHOSPHATE TOT (AS P) |      |       |

TOTAL CATIONS 13.94 TOTAL ANIONS 13.80

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) -0.47

|                             |         |                           |        |
|-----------------------------|---------|---------------------------|--------|
| CALCULATED DISSOLVED SOLIDS | 735.64  | TOTAL HARDNESS AS CaCO3   | 508.44 |
| SUM OF DISS. CONSTITUENT    | 1005.06 | TOTAL ALKALINITY AS CaCO3 | 435.51 |
| FIELD CONDUCTVY, MICROMHOS  | 1201.   | FIELD ALKALINITY AS CaCO3 | 446.0  |
| LAB CONDUCTVY, MICROMHOS    | 1111.   | RYZNAR STABILITY INDEX    | 6.86   |
| FIELD PH                    | 7.48    | LANGLIER SATURATION INDEX | 0.28   |
| LABORATORY PH               | 7.42    | SODIUM ADSORPTION RATIO   | 1.66   |

|                 |        |                   |       |
|-----------------|--------|-------------------|-------|
| PARAMETER       | VALUE  | PARAMETER         | VALUE |
| FIELD TEMP. AIR | 21.5 C | FIELD TEMP. WATER | 8.8 C |

DISSOLVD SOLIDS(CALC MG/L) 736.

REMARKS: OWNER: ARNOLD GETTEL \* RAIN GAGE IN FRONT YARD

EXPLANATION: MG/L = MILLIGRAMS PER LITER; UG/L = MICROGRAMS PER LITER; MEQ/L = MILLIEQUIVALENTS PER LITER; FT = FEET; MT = METERS; (M) = MEASURED; (E) = ESTIMATED; (R) = REPORTED; TR = TOTAL RECOVERABLE; TOT = TOTAL; BIO = BIOLOGICALLY AVAILABLE.

OTHER AVAILABLE DATA QW NA S2 WJ OW PW AT OTHER  
OTHER FILE NUMBERS: Y Y

PROJECT: COST:  
LAST EDIT DATE: 23-SEP-83 BY: TP \*JKS  
PROCESSING PROGRAM: F1730P V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
18.7 54.2 26.9 0.2 2.1 33.4 64.6 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 82Q0250

MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 81Q0164

|                    |                        |                          |                 |
|--------------------|------------------------|--------------------------|-----------------|
| STATE              | MONTANA                | COUNTY                   | TETON           |
| LATITUDE-LONGITUDE | 47D39'18"N 111D42'44"W | SITE LOCATION            | 22N 1W 15 DCCC  |
| UTM COORDINATES    | Z12 N E                | MBMG SITE                |                 |
| TOPOGRAPHIC MAP    | VAUGHN 15'             | STATION ID               | 473918111424401 |
| GEOLOGIC SOURCE    | 11OTRRX                | * SAMPLE SOURCE          | WELL            |
| DRAINAGE BASIN     | BD                     | LAND SURFACE ALTITUDE    | 3713. FT < 1.   |
| AGENCY + SAMPLER   | MBMG*RA                | SUSTAINED YIELD          |                 |
| BOTTLE NUMBER      | FAIR 15                | YIELD MEAS METHOD        |                 |
| DATE SAMPLED       | 03-APR-81              | TOTAL DEPTH OF WELL      | 40.0 FT (R)     |
| TIME SAMPLED       | 14:34 HOURS            | SWL ABOVE(-) OR BELOW GS | 34.24 FT (M)    |
| LAB + ANALYST      | MBMG*FNA               | CASING DIAMETER          | 6 IN (M)        |
| DATE ANALYZED      | 02-JUN-81              | CASING TYPE              | STEEL           |
| SAMPLE HANDLING    | 5330                   | COMPLETION TYPE          | 12%             |
| METHOD SAMPLED     | PUMPED                 | PERFORATION INTERVAL     |                 |
| WATER USE          | DOMESTIC               |                          |                 |

SAMPLING SITE JOHNSON, NEAL \* APPROX 4 MI SOUTH OF POWER  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L | MEQ/L |                      | MG/L | MEQ/L |
|----------------|------|-------|----------------------|------|-------|
| CALCIUM (CA)   | 27.0 | 1.35  | BICARBONATE (HCO3)   | 365. | 5.98  |
| MAGNESIUM (MG) | 56.3 | 4.63  | CARBONATE (CO3)      | 0.   |       |
| SODIUM (NA)    | 31.2 | 1.36  | CHLORIDE (CL)        | 6.7  | 0.19  |
| POTASSIUM (K)  | 1.3  | 0.03  | SULFATE (SO4)        | 47.4 | 0.99  |
| IRON (FE)      | .007 | 0.00  | NITRATE (AS N)       | 3.82 | 0.27  |
| MANGANESE (MN) | .003 | 0.00  | FLUORIDE (F)         | .86  | 0.05  |
| SILICA (SIO2)  | 10.9 |       | PHOSPHATE TOT (AS P) |      |       |

TOTAL CATIONS 7.37 TOTAL ANIONS 7.48

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) 0.49

|                             |        |                           |        |
|-----------------------------|--------|---------------------------|--------|
| CALCULATED DISSOLVED SOLIDS | 365.29 | TOTAL HARDNESS AS CaCO3   | 299.15 |
| SUM OF DISS. CONSTITUENT    | 550.49 | TOTAL ALKALINITY AS CaCO3 | 299.36 |
| FIELD CONDUCTVY, MICRONHOS  |        | FIELD ALKALINITY AS CaCO3 | 314.0  |
| LAB CONDUCTVY, MICRONHOS    | 642.2  | RYZNAR STABILITY INDEX    | 7.35   |
| FIELD PH                    | 7.90   | LANGLIER SATURATION INDEX | 0.24   |
| LABORATORY PH               | 7.93   | SODIUM ADSORPTION RATIO   | 0.78   |

| PARAMETER                   | VALUE  | PARAMETER                   | VALUE |
|-----------------------------|--------|-----------------------------|-------|
| FIELD TEMP, WATER           | 10.0 C |                             |       |
| ALUMINUM, DISS (MG/L-AL)    | <.03   | NICKEL, DISS (MG/L AS NI)   | .02   |
| SILVER, DISS (MG/L AS AG)   | <.002  | LEAD, DISS (MG/L AS PB)     | <.04  |
| BORON, DISS (MG/L AS B)     | <.02   | STRONTIUM, DISS (MG/L-SR)   | .56   |
| CADMIUM, DISS (MG/L AS CD)  | <.002  | TITANIUM DISS (MG/L AS TI)  | <.001 |
| CHROMIUM, DISS (MG/L-CR)    | <.002  | VANADIUM, DISS (MG/L AS V)  | <.001 |
| COPPER, DISS (MG/L AS CU)   | .010   | ZINC, DISS (MG/L AS ZN)     | .038  |
| LITHIUM, DISS (MG/L AS LI)  | .027   | ZIRCONIUM DISS (MG/L AS ZR) | <.004 |
| PHOSPHORUS, TOTAL (MG/L-P)  | .013   | SELENIUM, DISS (UG/L-SE)    | 3.5   |
| O-PHOSPHATE, DISS (MG/L-P)  | .010   | CARBON, TOT, ORG. (MG/L-C)  | 3.9   |
| NITROGEN, KJEL, TO (MG/L-N) | <.1    |                             |       |

REMARKS: THE WELL WAS DRILLED IN 1975 BY RAY ANDERSON OF CHOTEAU \*

EXPLANATION: MG/L = MILLIGRAMS PER LITER, UG/L = MICROGRAMS PER LITER, MEQ/L = MILLIEQUIVALENTS PER LITER, FT = FEET, MT = METERS, (M) = MEASURED, (E) = ESTIMATED, (R) = REPORTED, TR = TOTAL RECOVERABLE, TOT = TOTAL, BIO = BIOLOGICALLY AVAILABLE.

OTHER AVAILABLE DATA QW WA S2 WI OW PW AT OTHER  
OTHER FILE NUMBERS: Y

PROJECT: COST:  
LAST EDIT DATE: 12-MAR-84 BY: TP \*BCS  
PROCESSING PROGRAM: F1730P V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
18.3 42.8 18.4 0.5 2.6 13.8 83.6 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 81Q0164



MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 81Q1566

STATE MONTANA COUNTY TETON  
LATITUDE-LONGITUDE 47D39'18"N 111D42'44"W SITE LOCATION 22N 1W 15 DDCC 01  
UTM COORDINATES Z N E MBMG SITE  
TOPOGRAPHIC MAP VAUGHN 15' STATION ID 473918111424401  
GEOLOGIC SOURCE 1101RRC\* \* SAMPLE SOURCE WELL  
DRAINAGE BASIN RD LAND SURFACE ALTITUDE 3713.0 FT < 10  
AGENCY + SAMPLER MBMG\*RRAN SUSTAINED YIELD  
BOTTLE NUMBER FR2-15S YIELD MEAS METHOD  
DATE SAMPLED 03-SEP-81 TOTAL DEPTH OF WELL 40.0 FT (M)  
TIME SAMPLED 08:25 HOURS SWL ABOVE(-) OR BELOW GS 26.46 FT (M)  
LAB + ANALYST MBMG\*FNA CASING DIAMETER 6 IN (M)  
DATE ANALYZED 15-OCT-81 CASING TYPE STEEL  
SAMPLE HANDLING 4230 COMPLETION TYPE 01\*  
METHOD SAMPLED PUMPED PERFORATION INTERVAL  
WATER USE DOMESTIC

SAMPLING SITE JOHNSON, NEAL: APPROX 4 MI S OF POWER \*  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L  | MEQ/L |                      | MG/L | MEQ/L |
|----------------|-------|-------|----------------------|------|-------|
| CALCIUM (CA)   | 27.9  | 1.39  | BICARBONATE (HCO3)   | 379. | 4.21  |
| MAGNESIUM (MG) | 61.6  | 5.07  | CARBONATE (CO3)      | 0.   |       |
| SODIUM (NA)    | 31.3  | 1.36  | CHLORIDE (CL)        | 10.  | 0.28  |
| POTASSIUM (K)  | 1.3   | 0.03  | SULFATE (SO4)        | 48.5 | 1.01  |
| IRON (FE)      | .002  | 0.00  | NITRATE (AS N)       | 11.3 | 0.81  |
| MANGANESE (MN) | <.001 |       | FLUORIDE (F)         | .83  | 0.04  |
| SILICA (SI02)  | 10.5  |       | PHOSPHATE TOT (AS P) |      |       |

TOTAL CATIONS 7.85 TOTAL ANIONS 8.35

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) 2.23

| CALCULATED DISSOLVED SOLIDS   | 389.93 | TOTAL HARDNESS AS CaCO3   | 323.21 |
|-------------------------------|--------|---------------------------|--------|
| SUM OF DISS. CONSTITUENT      | 582.23 | TOTAL ALKALINITY AS CaCO3 | 310.84 |
| FIELD CONDUCTIVITY, MICROMHOS | 671.   | FIELD ALKALINITY AS CaCO3 | 324.0  |
| LAB CONDUCTIVITY, MICROMHOS   | 736.4  | RYZNAK STABILITY INDEX    | 7.07   |
| FIELD PH                      | 7.85   | LANGLIER SATURATION INDEX | 0.49   |
| LABORATORY PH                 | 8.05   | SODIUM ADSORPTION RATIO   | 0.76   |

| PARAMETER                  | VALUE | PARAMETER                  | VALUE |
|----------------------------|-------|----------------------------|-------|
| FIELD TEMP, WATER          | 9.0 C |                            |       |
| LITHIUM, DISS (MG/L AS LI) | .038  | DISSOLV SOLIDS (CALC MG/L) | 390.  |

REMARKS: WELL DRILLED BY RAY ANDERSON OF CHOTEAU IN 1975 \*  
LAB: FU CA 28.8, MG 65.7 & NA 32.7 MG/L GIVE .2 SIGMA & 8.3 TOT CATION MEQ/L

EXPLANATION: MG/L = MILLIGRAMS PER LITER, UG/L = MICROGRAMS PER LITER, MEQ/L =  
MILLIEQUIVALENTS PER LITER, FT = FEET, MT = METERS, (M) = MEASURED, (E) =  
ESTIMATED, (R) = REPORTED, TR = TOTAL RECOVERABLE, TOT = TOTAL,  
BIO = BIOLOGICALLY AVAILABLE.

OTHER AVAILABLE DATA QW WA S2 WJ QW PW AT OTHER  
OTHER FILE NUMBERS: Y

PROJECT: COST:  
LAST EDIT DATE: 04-FEB-83 BY: TP \*BCS  
PROCESSING PROGRAM: F1730P V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
17.7 64.5 17.3 0.4 3.8 13.5 82.8 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 81Q1566

MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 82Q0255

STATE MONTANA COUNTY TETON  
LATITUDE-LONGITUDE 47D39'18"N 111D42'44"W SITE LOCATION 22N 1W 15XNDCC 01  
UTM COORDINATES Z N E MBMG SITE  
TOPOGRAPHIC MAP VAUGHN 15' STATION ID 473918111424401  
GEOLOGIC SOURCE 110TRRC\* \* \* SAMPLE SOURCE WELL  
DRAINAGE BASIN RD LAND SURFACE ALTITUDE 3713.0 FT < 10  
AGENCY + SAMPLER MBMG\*FNA SUSTAINED YIELD  
BOTTLE NUMBER FAIR15U YIELD MEAS METHOD  
DATE SAMPLED 12-MAY-82 TOTAL DEPTH OF WELL 40.0 FT (M)  
TIME SAMPLED 08:30 HOURS SWL ABOVE(-) OR BELOW GS 34.23 FT (M)  
LAB + ANALYST MBMG\*FNA CASING DIAMETER 6 IN (M)  
DATE ANALYZED 10-JUN-82 CASING TYPE STEEL  
SAMPLE HANDLING 4230 COMPLETION TYPE 01\*01  
METHOD SAMPLED PUMPED PERFORATION INTERVAL  
WATER USE DOMESTIC

SAMPLING SITE NEAL JOHNSON\*APPROX. 4 MI SOUTH OF POWER  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L  | MEQ/L |                      | MG/L | MEQ/L |
|----------------|-------|-------|----------------------|------|-------|
| CALCIUM (CA)   | 27.1  | 1.35  | BICARBONATE (HCO3)   | 401. | 6.57  |
| MAGNESIUM (MG) | 59.6  | 4.90  | CARBONATE (CO3)      | .0   |       |
| SODIUM (NA)    | 40.3  | 1.75  | CHLORIDE (CL)        | 9.9  | 0.28  |
| POTASSIUM (K)  | 1.1   | 0.03  | SULFATE (SO4)        | 46.4 | 0.97  |
| IRON (FE)      | .011  | 0.00  | NITRATE (AS N)       | 8.11 | 0.58  |
| MANGANESE (MN) | <.001 |       | FLUORIDE (F)         | .85  | 0.04  |
| SILICA (SIO2)  | 10.3  |       | PHOSPHATE TOT (AS P) |      |       |

TOTAL CATIONS 8.04 TOTAL ANIONS 8.44

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) 1.79

|                             |        |                           |        |
|-----------------------------|--------|---------------------------|--------|
| CALCULATED DISSOLVED SOLIDS | 401.21 | TOTAL HARDNESS AS CaCO3   | 312.98 |
| SUM OF DISS. CONSTITUENT    | 404.67 | TOTAL ALKALINITY AS CaCO3 | 328.89 |
| FIELD CONDUCTVY, MICROMHOS  | 786.   | FIELD ALKALINITY AS CaCO3 | 348.0  |
| LAB CONDUCTVY, MICROMHOS    | 696.4  | RYZNAR STABILITY INDEX    | 7.21   |
| FIELD PH                    | 7.76   | LANGLIER SATURATION INDEX | 0.34   |
| LABORATORY PH               | 7.89   | SODIUM ADSORPTION RATIO   | 0.99   |

| PARAMETER       | VALUE  | PARAMETER         | VALUE |
|-----------------|--------|-------------------|-------|
| FIELD TEMP. AIR | 14.5 C | FIELD TEMP. WATER | 9.6 C |

DISSOLVD SOLIDS(CALC MG/L 401.

REMARKS: WELL DRILLED BY RAY ANDERSON OF CHOTEAU IN 1975  
LAB: FU CA 27.3; MG 62.0; NA 41.8 GIVES 8.31 MEQ CATIONS FOR .56 SIGMA

EXPLANATION: MG/L = MILLIGRAMS PER LITER, UG/L = MICROGRAMS PER LITER, MEQ/L =  
MILLIEQUIVALENTS PER LITER, FT = FEET, MT = METERS, (M) = MEASURED, (E) =  
ESTIMATED, (R) = REPORTED, TR = TOTAL RECOVERABLE, TOT = TOTAL,  
BIO = BIOLOGICALLY AVAILABLE.

|                      | QW | WA | S2 | WI | OW | PW | AT | OTHER |
|----------------------|----|----|----|----|----|----|----|-------|
| OTHER AVAILABLE DATA | Y  | Y  |    |    |    |    |    |       |
| OTHER FILE NUMBERS:  |    |    |    |    |    |    |    |       |

PROJECT: COST:  
LAST EDIT DATE: 23-SEP-83 BY: TP \*JKS  
PROCESSING PROGRAM: F1730F V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
16.8 61.0 21.8 0.4 3.6 12.4 84.1 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 82Q0255



MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 81Q0163

STATE MONTANA COUNTY TETON  
LATITUDE-LONGITUDE 47D37'29"N 111D44'25"W SITE LOCATION 22N 1W 29 BBBB  
UTM COORDINATES 7 N E MBMG SITE  
TOPOGRAPHIC MAP FAIRFIELD 15' STATION ID 473729111442501  
GEOLOGIC SOURCE 110TRRC\* \* SAMPLE SOURCE WELL  
DRAINAGE BASIN BD LAND SURFACE ALTITUDE 3863 FT < 1.  
AGENCY + SAMPLER MBMG\*RAM SUSTAINED YIELD 5 GPM  
BOTTLE NUMBER FAIR 14 YIELD MEAS METHOD REPORTED  
DATE SAMPLED 03-APR-81 TOTAL DEPTH OF WELL 18 FT (M)  
TIME SAMPLED 13:21 HOURS SWL ABOVE(-) OR BELOW GS 7.35 FT (M)  
LAB + ANALYST MBMG\*FNA CASING DIAMETER 6 IN (M)  
DATE ANALYZED 02-JUN-81 CASING TYPE STEEL  
SAMPLE HANDLING 5330 COMPLETION TYPE 01\*  
METHOD SAMPLED PUMPED PERFORATION INTERVAL  
WATER USE DOMESTIC AND STOCK

SAMPLING SITE LATTIN, WILLIAM \*APPROX 6.5 MI SW OF POWER  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L | MEQ/L |                      | MG/L | MEQ/L |
|----------------|------|-------|----------------------|------|-------|
| CALCIUM (CA)   | 26.0 | 1.30  | BICARBONATE (HCO3)   | 416. | 6.82  |
| MAGNESIUM (MG) | 58.8 | 4.84  | CARBONATE (CO3)      | 0.   |       |
| SODIUM (NA)    | 44.1 | 1.92  | CHLORIDE (CL)        | 8.8  | 0.25  |
| POTASSIUM (K)  | 1.1  | 0.03  | SULFATE (SO4)        | 53.5 | 1.11  |
| IRON (FE)      | .008 | 0.00  | NITRATE (AS N)       | 3.37 | 0.24  |
| MANGANESE (MN) | .002 | 0.00  | FLUORIDE (F)         | .96  | 0.05  |
| SILICA (SIO2)  | 10.6 |       | PHOSPHATE TOT (AS P) |      |       |

TOTAL CATIONS 8.08 TOTAL ANIONS 8.47

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) 1.72

|                             |        |                           |        |
|-----------------------------|--------|---------------------------|--------|
| CALCULATED DISSOLVED SOLIDS | 412.17 | TOTAL HARDNESS AS CaCO3   | 306.94 |
| SUM OF DISS. CONSTITUENT    | 623.24 | TOTAL ALKALINITY AS CaCO3 | 341.19 |
| FIELD CONDUCTVY, MICROMHOS  |        | FIELD ALKALINITY AS CaCO3 | 360.0  |
| LAB CONDUCTVY, MICROMHOS    | 778.5  | RYZNAR STABILITY INDEX    | 7.33   |
| FIELD PH                    | 7.88   | LANGLIER SATURATION INDEX | 0.22   |
| LABORATORY PH               | 7.77   | SODIUM ADSORPTION RATIO   | 1.10   |

| PARAMETER                  | VALUE | PARAMETER                    | VALUE |
|----------------------------|-------|------------------------------|-------|
| FIELD TEMP. WATER          | 8. C  |                              |       |
| ALUMINUM, DISS (MG/L-AL)   | <.03  | NICKEL, DISS (MG/L AS NI)    | .01   |
| SILVER, DISS (MG/L AS AG)  | <.002 | LEAD, DISS (MG/L AS PB)      | <.04  |
| BORON, DISS (MG/L AS B)    | <.02  | STRONTIUM, DISS (MG/L-SR)    | .56   |
| CADMIUM, DISS (MG/L AS CD) | <.002 | TITANIUM, DISS (MG/L AS TI)  | .004  |
| CHROMIUM, DISS (MG/L-CR)   | <.002 | VANADIUM, DISS (MG/L AS V)   | <.001 |
| COPPER, DISS (MG/L AS CU)  | <.002 | ZINC, DISS (MG/L AS ZN)      | .015  |
| LITHIUM, DISS (MG/L AS LI) | .037  | ZIRCONIUM, DISS (MG/L AS ZR) | <.004 |
| MOLYBDENUM, DISS (MG/L-MO) | <.02  | SELENIUM, DISS (UG/L-SE)     | 1.5   |
| PHOSPHORUS, TOTAL (MG/L-P) | .006  | NITROGEN, KJEL, TO (MG/L-N)  | <.1   |
| O-PHOSPHATE, DISS (MG/L-P) | .003  |                              |       |

LAB: FU CA 25.6; MG 60.7; NA 45.5; K 1.5 MG/L GIVES .778 SIGMA \*

EXPLANATION: MG/L = MILLIGRAMS PER LITER, UG/L = MICROGRAMS PER LITER, MEQ/L =  
MILLIEQUIVALENTS PER LITER, FT = FEET, MT = METERS, (M) = MEASURED, (E) =  
ESTIMATED, (R) = REPORTED, TR = TOTAL RECOVERABLE, TOT = TOTAL.  
BIO = BIOLOGICALLY AVAILABLE.

OTHER AVAILABLE DATA QW NA S2 WJ OW PN AT OTHER  
OTHER FILE NUMBERS: Y

PROJECT: COST:  
LAST EDIT DATE: 12-MAR-84 BY: TP \*BCS  
PROCESSING PROGRAM: F1730P V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
16.1 59.2 23.7 0.4 3.0 13.6 83.3 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 81Q0163

MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 81Q1565

|                    |                        |                          |                   |
|--------------------|------------------------|--------------------------|-------------------|
| STATE              | MONTANA                | COUNTY                   | TETON             |
| LATITUDE-LONGITUDE | 47D38'22"N 111D46'17"W | SITE LOCATION            | 22N 1W 29 BBBB 01 |
| UTM COORDINATES    | Z N E                  | MBMG SITE                |                   |
| TOPOGRAPHIC MAP    | FAIRFIELD 15'          | STATION ID               | 473822111461701   |
| GEOLOGIC SOURCE    | 110TRRC*               | SAMPLE SOURCE            | WELL              |
| DRAINAGE BASIN     | BD                     | LAND SURFACE ALTITUDE    | 3863.0 FT < 10    |
| AGENCY + SAMPLER   | MBMG*RAM               | SUSTAINED YIELD          |                   |
| BOTTLE NUMBER      | FR2-14S                | YIELD MEAS METHOD        |                   |
| DATE SAMPLED       | 03-SEP-81              | TOTAL DEPTH OF WELL      | 18.0 FT (M)       |
| TIME SAMPLED       | 13:30 HOURS            | SWL ABOVE(-) OR BELOW GS | 6.48 FT (M)       |
| LAB + ANALYST      | MBMG*FNA               | CASING DIAMETER          | 4 IN (M)          |
| DATE ANALYZED      | 15-OCT-81              | CASING TYPE              | STEEL             |
| SAMPLE HANDLING    | 4230                   | COMPLETION TYPE          | 01*               |
| METHOD SAMPLED     | PUMPED                 | PERFORATION INTERVAL     |                   |
| WATER USE          | DOMESTIC               |                          |                   |

SAMPLING SITE LATTIN, WILLIAM; APPROX 6.5 MI SW OF POWER  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L  | MEQ/L |                      | MG/L | MEQ/L |
|----------------|-------|-------|----------------------|------|-------|
| CALCIUM (CA)   | 28.3  | 1.41  | BICARBONATE (HCO3)   | 415. | 6.80  |
| MAGNESIUM (MG) | 62.5  | 5.14  | CARBONATE (CO3)      | 0.   |       |
| SODIUM (NA)    | 44.6  | 1.94  | CHLORIDE (CL)        | 8.8  | 0.25  |
| POTASSIUM (K)  | 1.4   | 0.04  | SULFATE (SO4)        | 63.2 | 1.32  |
| IRON (FE)      | .006  | 0.00  | NITRATE (AS N)       | 5.11 | 0.36  |
| MANGANESE (MN) | <.001 |       | FLUORIDE (F)         | .9   | 0.05  |
| SILICA (SIO2)  | 11.5  |       | PHOSPHATE TOT (AS P) |      |       |

TOTAL CATIONS 8.53 TOTAL ANIONS 8.78

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) 1.07

|                             |        |                           |        |
|-----------------------------|--------|---------------------------|--------|
| CALCULATED DISSOLVED SOLIDS | 430.75 | TOTAL HARDNESS AS CaCO3   | 327.92 |
| SUM OF DISS. CONSTITUENT    | 641.32 | TOTAL ALKALINITY AS CaCO3 | 340.37 |
| FIELD CONDUCTVY, MICROMHOS  | 775.   | FIELD ALKALINITY AS CaCO3 | 356.0  |
| LAB CONDUCTVY, MICROMHOS    | 773.7  | RYZNAR STABILITY INDEX    | 7.07   |
| FIELD PH                    | 7.14   | LANGLIER SATURATION INDEX | 0.44   |
| LABORATORY PH               | 7.96   | SODIUM ADSORPTION RATIO   | 1.07   |

| PARAMETER                  | VALUE  | PARAMETER                   | VALUE |
|----------------------------|--------|-----------------------------|-------|
| FIELD TEMP, WATER          | 10.5 C |                             |       |
| LITHIUM, DISS (MG/L AS LI) | .051   | DISSOLVD SOLIDS (CALC MG/L) | 431.  |

EXPLANATION: MG/L = MILLIGRAMS PER LITER, UG/L = MICROGRAMS PER LITER, MEQ/L = MILLIEQUIVALENTS PER LITER, FT = FEET, MT = METERS, (M) = MEASURED, (E) = ESTIMATED, (R) = REPORTED, TR = TOTAL RECOVERABLE, TOT = TOTAL, BIO = BIOLOGICALLY AVAILABLE.

OTHER AVAILABLE DATA QW WA S2 WI OW PW AT OTHER  
OTHER FILE NUMBERS: Y

PROJECT: COST:  
LAST EDIT DATE: 04-FEB-83 BY: TP \*BCS  
PROCESSING PROGRAM: F1730P V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
16.6 60.3 22.7 0.4 3.0 15.7 81.3 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 81Q1565



MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 82Q0254

STATE MONTANA COUNTY TETON  
LATITUDE-LONGITUDE 47D38'22"N 111D46'17"W SITE LOCATION 22N 1W 29\*BBBB 01  
UTM COORDINATES Z N E MBMG-SITE  
TOPOGRAPHIC MAP FAIRFIELD 15' STATION ID 473822111461701  
GEOLOGIC SOURCE 110TRRC\* \* SAMPLE SOURCE WELL  
DRAINAGE BASIN RD LAND SURFACE ALTITUDE 3863. FT < 10  
AGENCY + SAMPLER MBMG\*RAM SUSTAINED YIELD  
BOTTLE NUMBER FAIR14U YIELD MEAS METHOD  
DATE SAMPLED 12-MAY-82 TOTAL DEPTH OF WELL 18.0 FT (M)  
TIME SAMPLED 09:30 HOURS SWL ABOVE(-) OR BELOW GS 8.02 FT (M)  
LAB + ANALYST MBMG\*FNA CASING DIAMETER 6 IN (M)  
DATE ANALYZED 23-JUN-82 COMPLETION TYPE STEEL  
SAMPLE HANDLING 4230 PERFORATION INTERVAL  
METHOD SAMPLED PUMPED  
WATER USE DOMESTIC

SAMPLING SITE LATTIN, WILLIAM\*APPROX. 6.5 MI SW OF POWER  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L  | MEQ/L |                      | MG/L | MEQ/L |
|----------------|-------|-------|----------------------|------|-------|
| CALCIUM (CA)   | 27.02 | 1.35  | BICARBONATE (HCO3)   | 379. | 6.21  |
| MAGNESIUM (MG) | 59.54 | 4.90  | CARBONATE (CO3)      | .0   |       |
| SODIUM (NA)    | 39.94 | 1.74  | CHLORIDE (CL)        | 7.0  | 0.20  |
| POTASSIUM (K)  | 1.2   | 0.03  | SULFATE (SO4)        | 46.5 | 0.97  |
| IRON (FE)      | .007  | 0.00  | NITRATE (AS N)       | 6.46 | 0.46  |
| MANGANESE (MN) | <.002 |       | FLUORIDE (F)         | .99  | 0.05  |
| SILICA (SIO2)  | 10.1  |       | PHOSPHATE TOT (AS P) |      |       |

TOTAL CATIONS 8.01 TOTAL ANIONS 7.89

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) -0.56

|                             |        |                           |        |
|-----------------------------|--------|---------------------------|--------|
| CALCULATED DISSOLVED SOLIDS | 385.46 | TOTAL HARDNESS AS CaCO3   | 312.54 |
| SUM OF DISS. CONSTITUENT    | 577.76 | TOTAL ALKALINITY AS CaCO3 | 310.84 |
| FIELD CONDUCTVY, MICROMHOS  | 729.   | FIELD ALKALINITY AS CaCO3 | 328.0  |
| LAB CONDUCTVY, MICROMHOS    | 644.1  | RYZNAR STABILITY INDEX    | 7.41   |
| FIELD PH                    | 7.85   | LANGLIER SATURATION INDEX | 0.16   |
| LABORATORY PH               | 7.74   | SODIUM ADSORPTION RATIO   | 0.98   |

| PARAMETER                  | VALUE  | PARAMETER                  | VALUE |
|----------------------------|--------|----------------------------|-------|
| FIELD TEMP, AIR            | 17.5 C | FIELD TEMP, WATER          | 7.5 C |
| LITHIUM, DISS (MG/L AS LI) | .052   | DISSOLV SOLIDS (CALC MG/L) | 385.  |

EXPLANATION: MG/L = MILLIGRAMS PER LITER, UG/L = MICROGRAMS PER LITER, MEQ/L =  
MILLIEQUIVALENTS PER LITER, FT = FEET, MT = METERS, (M) = MEASURED, (E) =  
ESTIMATED, (R) = REPORTED, TR = TOTAL RECOVERABLE, TOT = TOTAL,  
BIO = BIOLOGICALLY AVAILABLE.

OTHER AVAILABLE DATA QW WA S2 WJ OW PW AT OTHER  
OTHER FILE NUMBERS: Y Y

PROJECT: COST:  
LAST EDIT DATE: 23-SEP-83 BY: TP \*JKS  
PROCESSING PROGRAM: F1730P V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
16.8 41.1 21.7 0.4 2.7 13.1 84.2 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 82Q0254

MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 81Q1564

STATE MONTANA COUNTY TETON  
LATITUDE-LONGITUDE 47D37'29"N 111D44'25"W SITE LOCATION 22N 1W 33 ARBB.01  
UTM COORDINATES Z N E MBMG SITE  
TOPOGRAPHIC MAP VAUGHN 15' STATION ID 473729111442501  
GEOLOGIC SOURCE 110TRRC\* \* \* SAMPLE SOURCE WELL  
DRAINAGE BASIN BD LAND SURFACE ALTITUDE 3829.0 FT < 10  
AGENCY + SAMPLER MBMG\*RRAN SUSTAINED YIELD  
BOTTLE NUMBER FR2-13S YIELD MEAS METHOD  
DATE SAMPLED 03-SEP-81 TOTAL DEPTH OF WELL (M)  
TIME SAMPLED 14:30 HOURS SWL ABOVE(-) OR BELOW BS 4.6 FT (M)  
LAB + ANALYST MBMG\*FNA CASING DIAMETER 6 IN (M)  
DATE ANALYZED 15-OCT-81 CASING TYPE STEEL  
SAMPLE HANDLING 4230 COMPLETION TYPE 01\*  
METHOD SAMPLED PUMPED PERFORATION INTERVAL  
WATER USE DOMESTIC

SAMPLING SITE HANGOLD, GERALD: APPROX 6.5 MI SW OF POWER  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L  | MEQ/L |                      | MG/L | MEQ/L |
|----------------|-------|-------|----------------------|------|-------|
| CALCIUM (CA)   | 27.6  | 1.38  | BICARBONATE (HCO3)   | 522. | 8.56  |
| MAGNESIUM (MG) | 84.5  | 6.95  | CARBONATE (CO3)      | 0.   |       |
| SODIUM (NA)    | 73.6  | 3.20  | CHLORIDE (CL)        | 18.6 | 0.52  |
| POTASSIUM (K)  | 1.    | 0.03  | SULFATE (SO4)        | 121. | 2.52  |
| IRON (FE)      | .007  | 0.00  | NITRATE (AS N)       | 5.58 | 0.40  |
| MANGANESE (MN) | <.001 |       | FLUORIDE (F)         | 1.23 | 0.06  |
| SILICA (SIO2)  | 11.9  |       | PHOSPHATE TOT (AS P) |      |       |

TOTAL CATIONS 11.56 TOTAL ANIONS 12.06

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) 1.82

|                             |        |                           |        |
|-----------------------------|--------|---------------------------|--------|
| CALCULATED DISSOLVED SOLIDS | 602.16 | TOTAL HARDNESS AS CaCO3   | 416.72 |
| SUM OF DISS. CONSTITUENT    | 837.02 | TOTAL ALKALINITY AS CaCO3 | 428.13 |
| FIELD CONDUCTVY, MICROMHOS  | 1013.  | FIELD ALKALINITY AS CaCO3 | 440.0  |
| LAB CONDUCTVY, MICROMHOS    | 1038.  | RYZNAR STABILITY INDEX    | 6.88   |
| FIELD PH                    | 7.35   | LANGLIER SATURATION INDEX | 0.55   |
| LABORATORY PH               | 7.98   | SODIUM ADSORPTION RATIO   | 1.57   |

| PARAMETER                  | VALUE  | PARAMETER                   | VALUE |
|----------------------------|--------|-----------------------------|-------|
| FIELD TEMP. WATER          | 12.0 C |                             |       |
| LITHIUM, DISS (MG/L AS LI) | .059   | DISSOLVD SOLIDS (CALC MG/L) | 602.  |

LAB: FU CA 28.7, MG 91.0, NA 79.2 MG/L \*

EXPLANATION: MG/L = MILLIGRAMS PER LITER, UG/L = MICROGRAMS PER LITER, MEQ/L = MILLIEQUIVALENTS PER LITER, FT = FEET, MT = METERS, (M) = MEASURED, (E) = ESTIMATED, (R) = REPORTED, TR = TOTAL RECOVERABLE, TOT = TOTAL, BIO = BIOLOGICALLY AVAILABLE.

OTHER AVAILABLE DATA QW WA S2 WI OW PW AT OTHER  
OTHER FILE NUMBERS:

PROJECT: COST:  
LAST EDIT DATE: 04-FEB-83 BY: TP \*BCS  
PROCESSING PROGRAM: F1730P V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
11.9 30.2 27.7 0.2 4.5 21.7 73.8 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 81Q1564



MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 82Q0253

STATE MONTANA COUNTY TETON  
LATITUDE-LONGITUDE 47°37'29"N 111°44'25"W SITE LOCATION 22N 1W 33\*ABBB 0  
UTM COORDINATES Z N E MBMG SITE  
TOPOGRAPHIC MAP VAUGHN 15' STATION ID 473729111442501  
GEOLOGIC SOURCE 110TRRC\* \* SAMPLE SOURCE WELL  
DRAINAGE BASIN BD LAND SURFACE ALTITUDE 3829.0 FT < 10  
AGENCY + SAMPLER MBMG\*RRAN SUSTAINED YIELD  
BOTTLE NUMBER FAIR13U YIELD MEAS METHOD  
DATE SAMPLED 12-MAY-82 TOTAL DEPTH OF WELL 59.0 FT (M)  
TIME SAMPLED 10:45 HOURS SWL ABOVE(-) OR BELOW GS 7.41 FT (M)  
LAB + ANALYST MBMG\*FNA CASING DIAMETER 6 IN (M)  
DATE ANALYZED 10-JUN-82 COMPLETION TYPE STEEL  
SAMPLE HANDLING 4230 PERFORATION INTERVAL 01\*  
METHOD SAMPLED PUMPED  
WATER USE DOMESTIC

SAMPLING SITE MANGOLD; GERALD\*APPROX. 6.5 MI SW OF POWER  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L | MEQ/L |                      | MG/L | MEQ/L |
|----------------|------|-------|----------------------|------|-------|
| CALCIUM (CA)   | 30.2 | 1.51  | BICARBONATE (HCO3)   | 542. | 8.88  |
| MAGNESIUM (MG) | 92.4 | 7.60  | CARBONATE (CO3)      | .0   |       |
| SODIUM (NA)    | 85.4 | 3.71  | CHLORIDE (CL)        | 29.6 | 0.83  |
| POTASSIUM (K)  | 1.0  | 0.03  | SULFATE (SO4)        | 109. | 2.27  |
| IRON (FE)      | .029 | 0.00  | NITRATE (AS N)       | 5.60 | 0.40  |
| MANGANESE (MN) | .004 | 0.00  | FLUORIDE (F)         | 1.5  | 0.08  |
| SILICA (SIO2)  | 10.2 |       | PHOSPHATE TOT (AS P) |      |       |

TOTAL CATIONS 12.85 TOTAL ANIONS 12.47

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) -1.33

|                             |        |                           |        |
|-----------------------------|--------|---------------------------|--------|
| CALCULATED DISSOLVED SOLIDS | 631.93 | TOTAL HARDNESS AS CaCO3   | 455.73 |
| SUM OF DISS. CONSTITUENT    | 906.93 | TOTAL ALKALINITY AS CaCO3 | 444.53 |
| FIELD CONDUCTVY, MICROMHOS  | 1201.  | FIELD ALKALINITY AS CaCO3 | 460.0  |
| LAB CONDUCTVY, MICROMHOS    | 1093.  | RYZNAR STABILITY INDEX    | 7.18   |
| FIELD PH                    | 7.80   | LANGLIER SATURATION INDEX | 0.19   |
| LABORATORY PH               | 7.56   | SODIUM ADSORPTION RATIO   | 1.74   |

| PARAMETER                  | VALUE  | PARAMETER                  | VALUE |
|----------------------------|--------|----------------------------|-------|
| FIELD TEMP. AIR            | 19.5 C | FIELD TEMP. WATER          | 7.0 C |
| LITHIUM, DISS (MG/L AS LI) | .064   | DISSOLV SOLIDS (CALC MG/L) | 632.  |

REMARKS: OWNER: GERALD MANGOLD

EXPLANATION: MG/L = MILLIGRAMS PER LITER, UG/L = MICROGRAMS PER LITER; MEQ/L  
MILLIEQUIVALENTS PER LITER, FT = FEET, MT = METERS, (M) = MEASURED, (E) =  
ESTIMATED, (R) = REPORTED, TR = TOTAL RECOVERABLE, TOT = TOTAL.  
BIO = BIOLOGICALLY AVAILABLE.

OTHER AVAILABLE DATA QW WA S2 WJ OW PW AT OTHER  
OTHER FILE NUMBERS: Y

PROJECT: COST:  
LAST EDIT DATE: 23-SEP-83 BY: TP \*JKS  
PROCESSING PROGRAM: F1730P V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
11.7 59.2 28.9 0.2 7.0 18.9 74.1 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 82Q0253



MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 81Q0160

STATE MONTANA COUNTY TETON  
LATITUDE-LONGITUDE 47D41'43"N 111D47'51"W SITE LOCATION 22N 2W 1 AACA  
UTM COORDINATES Z N E MBMG SITE  
TOPOGRAPHIC MAP FAIRFIELD 15' STATION ID 474143111475101  
GEOLOGIC SOURCE 110TRRC\*OSTBERG\* \* SAMPLE SOURCE WELL  
DRAINAGE BASIN BD LAND SURFACE ALTITUDE  
AGENCY + SAMPLER MBMG\*AN SUSTAINED YIELD  
BOTTLE NUMBER FAIR 11 YIELD MEAS METHOD  
DATE SAMPLED 02-APR-81 TOTAL DEPTH OF WELL 15.0 FT (M)  
TIME SAMPLED 16:46 HOURS SWL ABOVE(-) OR BELOW GS 8.22 FT (M)  
LAB + ANALYST MBMG\*FNA CASING DIAMETER 15 IN (M)  
DATE ANALYZED 01-JUN-81 CASING TYPE PVC  
SAMPLE HANDLING 5330 COMPLETION TYPE 01\*  
METHOD SAMPLED PUMPED PERFORATION INTERVAL  
WATER USE DOMESTIC

SAMPLING SITE OSTERBERG, RICK \* APPROX 5 MI WSW OF POWER  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L | MEQ/L |                      | MG/L | MEQ/L |
|----------------|------|-------|----------------------|------|-------|
| CALCIUM (CA)   | 59.5 | 2.97  | BICARBONATE (HCO3)   | 543. | 8.90  |
| MAGNESIUM (MG) | 67.0 | 5.51  | CARBONATE (CO3)      | .0   |       |
| SODIUM (NA)    | 47.2 | 2.05  | CHLORIDE (CL)        | 8.2  | 0.23  |
| POTASSIUM (K)  | 8.2  | 0.21  | SULFATE (SO4)        | 75.3 | 1.57  |
| IRON (FE)      | 4.54 | 0.24  | NITRATE (AS N)       | .91  | 0.06  |
| MANGANESE (MN) | 1.43 | 0.05  | FLUORIDE (F)         | .91  | 0.05  |
| SILICA (SIO2)  | 15.0 |       | PHOSPHATE TOT (AS P) |      |       |

TOTAL CATIONS 11.04 TOTAL ANIONS 10.81

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) -0.87

|                             |        |                           |        |
|-----------------------------|--------|---------------------------|--------|
| CALCULATED DISSOLVED SOLIDS | 555.68 | TOTAL HARDNESS AS CaCO3   | 424.34 |
| SUM OF DISS. CONSTITUENT    | 831.19 | TOTAL ALKALINITY AS CaCO3 | 445.35 |
| FIELD CONDUCTVY, MICROMHOS  |        | FIELD ALKALINITY AS CaCO3 | 470.   |
| LAB CONDUCTVY, MICROMHOS    | 973.5  | RYZNAR STABILITY INDEX    | 6.65   |
| FIELD PH                    | 7.13   | LANGLIER SATURATION INDEX | 0.42   |
| LABORATORY PH               | 7.50   | SODIUM ADSORPTION RATIO   | 1.00   |

| PARAMETER                  | VALUE | PARAMETER                    | VALUE |
|----------------------------|-------|------------------------------|-------|
| FIELD TEMP. WATER          | 6.8 C |                              |       |
| ALUMINUM, DISS (MG/L-AL)   | <.03  | NICKEL, DISS (MG/L AS NI)    | <.01  |
| SILVER, DISS (MG/L AS AG)  | <.002 | LEAD, DISS (MG/L AS PB)      | <.04  |
| BORON, DISS (MG/L AS B)    | <.02  | STRONTIUM, DISS (MG/L-SR)    | .68   |
| CADMIUM, DISS (MG/L AS CD) | <.002 | TITANIUM, DISS (MG/L AS TI)  | .005  |
| CHROMIUM, DISS (MG/L-CR)   | <.002 | VANADIUM, DISS (MG/L AS V)   | .001  |
| COPPER, DISS (MG/L AS CU)  | <.002 | ZINC, DISS (MG/L AS ZN)      | .24   |
| LITHIUM, DISS (MG/L AS LI) | .039  | ZIRCONIUM, DISS (MG/L AS ZR) | <.004 |
| MOLYBDENUM, DISS (MG/L-MO) | <.02  | SELENIUM, DISS (UG/L-SE)     | 1.2   |
| PHOSPHORUS, TOTAL (MG/L-P) | .203  | CARBON, TOT, ORG. (MG/L-C)   | 17.9  |
| O-PHOSPHATE, DISS (MG/L-P) | .078  | NITROGEN, KJEL, TO (MG/L-N)  | .7    |

REMARKS: WATER WAS GREEN IN COLOR AND HAD AN ODOR \*  
THIS IS NEW WELL LOCATED ON THE NW SIDE OF A NEW HOUSE \*

EXPLANATION: MG/L = MILLIGRAMS PER LITER; UG/L = MICROGRAMS PER LITER; MEQ/L =  
MILLIEQUIVALENTS PER LITER. FT = FEET, MT = METERS. (M) = MEASURED, (E) =  
ESTIMATED, (R) = REPORTED. TR = TOTAL RECOVERABLE. TOT = TOTAL.  
BIO = BIOLOGICALLY AVAILABLE.

QW NA S2 WI OW PW AT OTHER

OTHER AVAILABLE DATA  
OTHER FILE NUMBERS:

PROJECT: COST:  
LAST EDIT DATE: 12-MAR-84 BY: TP \*BCS  
PROCESSING PROGRAM: F1730P V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
27.6 51.3 19.1 2.0 2.2 14.7 83.2 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 81Q0160



MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 81Q1562

STATE MONTANA COUNTY TETON  
LATITUDE-LONGITUDE 47D41'43"N 111D47'51"W SITE LOCATION 22N 2W 1 AACA 01  
UTM COORDINATES Z N E MBMG SITE  
TOPOGRAPHIC MAP FAIRFIELD 15' STATION ID 474143111475101  
GEOLOGIC SOURCE 110TRRC\* \* SAMPLE SOURCE WELL  
DRAINAGE BASIN BD LAND SURFACE ALTITUDE 3795.0 FT < 10  
AGENCY + SAMPLER MBMG\* RAN SUSTAINED YIELD  
BOTTLE NUMBER FR2-11S YIELD MEAS METHOD  
DATE SAMPLED 03-SEP-81 TOTAL DEPTH OF WELL 15.0 FT (M)  
TIME SAMPLED 10:05 HOURS SWL ABOVE(-) OR BELOW GS 8.25 FT (M)  
LAB + ANALYST MBMG\* FNA CASING DIAMETER 15 IN (M)  
DATE ANALYZED 15-OCT-81 COMPLETION TYPE PVC  
SAMPLE HANDLING 4230 PERFORATION INTERVAL 01\*  
METHOD SAMPLED PUMPED  
WATER USE DOMESTIC

SAMPLING SITE OSTBERG, RICK: APPROX 5 MI WSW OF POWER \*  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L | MEQ/L |                      | MG/L | MEQ/L |
|----------------|------|-------|----------------------|------|-------|
| CALCIUM (CA)   | 42.5 | 2.12  | BICARBONATE (HCO3)   | 425. | 6.97  |
| MAGNESIUM (MG) | 69.  | 5.68  | CARBONATE (CO3)      | 0.   |       |
| SODIUM (NA)    | 42.6 | 1.85  | CHLORIDE (CL)        | 18.2 | 0.51  |
| POTASSIUM (K)  | 1.7  | 0.04  | SULFATE (SO4)        | 134. | 2.79  |
| IRON (FE)      | .079 | 0.00  | NITRATE (AS N)       | 1.25 | 0.09  |
| MANGANESE (MN) | .081 | 0.00  | FLUORIDE (F)         | 1.07 | 0.06  |
| SILICA (SIO2)  | 14.7 |       | PHOSPHATE TOT (AS P) |      |       |

TOTAL CATIONS 9.70 TOTAL ANIONS 10.41

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) 2.83

|                             |        |                           |        |
|-----------------------------|--------|---------------------------|--------|
| CALCULATED DISSOLVED SOLIDS | 534.54 | TOTAL HARDNESS AS CaCO3   | 390.13 |
| SUM OF DISS. CONSTITUENT    | 750.18 | TOTAL ALKALINITY AS CaCO3 | 348.57 |
| FIELD CONDUCTVY, MICROMHOS  | 903.   | FIELD ALKALINITY AS CaCO3 | 350.0  |
| LAB CONDUCTVY, MICROMHOS    | 897.3  | RYZNAR STABILITY INDEX    | 6.78   |
| FIELD PH                    | 7.00   | LANGLIER SATURATION INDEX | 0.55   |
| LABORATORY PH               | 7.88   | SODIUM ADSORPTION RATIO   | 0.94   |

| PARAMETER                  | VALUE  | PARAMETER                   | VALUE |
|----------------------------|--------|-----------------------------|-------|
| FIELD TEMP. WATER          | 13.0 C |                             |       |
| LITHIUM, DISS (MG/L AS LI) | .058   | DISSOLVD SOLIDS (CALC MG/L) | 535.  |

REMARKS: WATER HAS CLEARED OF GREENISH TINT SINCE SAMPLED IN APRIL \*  
MRS. OSTBERG STATES THERE IS A YELLOWISH TINT TO A BATHTUB FULL OF WATER \*

LAB: FU MAGNESIUM 76.5 MG/L GIVES .1 SIGMA & TOTAL MEQ/L CATIONS OF 10.3

EXPLANATION: MG/L = MILLIGRAMS PER LITER, UG/L = MICROGRAMS PER LITER, MEQ/L = MILLIEQUIVALENTS PER LITER, FT = FEET, MT = METERS, (N) = MEASURED, (E) = ESTIMATED, (R) = REPORTED, TR = TOTAL RECOVERABLE, TOT = TOTAL, BIO = BIOLOGICALLY AVAILABLE.

OTHER AVAILABLE DATA QW WA S2 WI OW PW AT OTHER  
OTHER FILE NUMBERS:

PROJECT: COST:  
LAST EDIT DATE: 04-FEB-83 BY: TP \*BCS  
PROCESSING PROGRAM: F1730P V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
21.9 58.6 19.1 0.5 5.0 27.2 67.8 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 81Q1562



MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. B2Q0251

STATE MONTANA COUNTY TETON  
LATITUDE-LONGITUDE 47D41'43"N 111D47'51"W SITE LOCATION 22N 2W 1\*AACA 01  
UTM COORDINATES Z N E MBMG SITE  
TOPOGRAPHIC MAP FAIRFIELD 15' STATION ID 474143111475101  
GEOLOGIC SOURCE 110TRRC\* \* \* SAMPLE SOURCE WELL  
DRAINAGE BASIN BD LAND SURFACE ALTITUDE 3795.0 FT < 10  
AGENCY + SAMPLER MBMG\*KRAN SUSTAINED YIELD  
BOTTLE NUMBER FAIR11U YIELD MEAS METHOD  
DATE SAMPLED 11-MAY-82 TOTAL DEPTH OF WELL 15.0 FT (M)  
TIME SAMPLED 17:00 HOURS SWL ABOVE(-) OR BELOW GS 9.31 FT (M)  
LAB + ANALYST MBMG\*FNA CASING DIAMETER 15 IN (M)  
DATE ANALYZED 10-JUN-82 CASING TYPE PVC  
SAMPLE HANDLING 4230 COMPLETION TYPE 01\*  
METHOD SAMPLED PUMPED PERFORATION INTERVAL  
WATER USE DOMESTIC

SAMPLING SITE OSTBERG RICKI\*APPROX. 5 MI WSW OF POWER  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L | MEQ/L |                      | MG/L | MEQ/L |
|----------------|------|-------|----------------------|------|-------|
| CALCIUM (CA)   | 33.7 | 1.68  | BICARBONATE (HCO3)   | 374. | 6.13  |
| MAGNESIUM (MG) | 51.5 | 4.24  | CARBONATE (CO3)      | .0   |       |
| SODIUM (NA)    | 35.1 | 1.53  | CHLORIDE (CL)        | 3.0  | 0.08  |
| POTASSIUM (K)  | 1.4  | 0.04  | SULFATE (SO4)        | 50.4 | 1.05  |
| IRON (FE)      | .024 | 0.00  | NITRATE (AS N)       | .53  | 0.04  |
| MANGANESE (MN) | .055 | 0.00  | FLUORIDE (F)         | 1.2  | 0.06  |
| SILICA (SIO2)  | 11.0 |       | PHOSPHATE TOT (AS P) |      |       |

TOTAL CATIONS 7.48 TOTAL ANIONS 7.36

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) -0.56

| CALCULATED DISSOLVED SOLIDS | 372.15 | TOTAL HARDNESS AS CaCO3   | 296.12 |
|-----------------------------|--------|---------------------------|--------|
| SUM OF DISS. CONSTITUENT    | 561.91 | TOTAL ALKALINITY AS CaCO3 | 306.74 |
| FIELD CONDUCTVY, MICROMHOS  | 670.   | FIELD ALKALINITY AS CaCO3 | 310.0  |
| LAB CONDUCTVY, MICROMHOS    | 644.9  | RYZNAR STABILITY INDEX    | 7.41   |
| FIELD PH                    | 7.55   | LANGLIER SATURATION INDEX | 0.07   |
| LABORATORY PH               | 7.56   | SODIUM ADSORPTION RATIO   | 0.89   |

| PARAMETER                 | VALUE  | PARAMETER         | VALUE |
|---------------------------|--------|-------------------|-------|
| FIELD TEMP. AIR           | 18.5 C | FIELD TEMP. WATER | 7.0 C |
| DISSOLVD SOLIDS(CALC MG/L | 372.   |                   |       |

REMARKS: WATER HAS CLEARED OF GREENISH TINT SINCE SAMPLED IN APRIL\*MRS. OSTBERG STATES THERE IS A YELLOWISH TINT TO A BATHTUB FULL OF WATER

EXPLANATION: MG/L = MILLIGRAMS PER LITER, UG/L = MICROGRAMS PER LITER, MEQ/L = MILLIEQUIVELENTS PER LITER, FT = FEET, MT = METERS, (M) = MEASURED, (E) = ESTIMATED, (R) = REPORTED, TR = TOTAL RECOVERABLE, TOT = TOTAL, BIO = BIOLOGICALLY AVAILABLE.

OTHER AVAILABLE DATA QW NA S2 WJ OW PW AT OTHER  
Y  
OTHER FILE NUMBERS:

PROJECT: COST:  
LAST EDIT DATE: 23-SEP-83 BY: TP \*JKS  
PROCESSING PROGRAM: F1730P V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
22.5 56.6 20.4 0.5 1.2 14.4 84.4 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: B2Q0251



MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 81Q0158

STATE MONTANA COUNTY TETON  
LATITUDE-LONGITUDE 47D41'27"N 111D53'48"W SITE LOCATION 22N 2W 5 BCDD  
UTM COORDINATES Z N E MBMG SITE  
TOPOGRAPHIC MAP FAIRFIELD 15' STATION ID 474127111534801  
GEOLOGIC SOURCE 110TRRC\* \* SAMPLE SOURCE SPRING  
DRAINAGE BASIN BD LAND SURFACE ALTITUDE 3858.0 FT < 1.  
AGENCY + SAMPLER MBMG\*RAM SUSTAINED YIELD  
BOTTLE NUMBER FAIR 9 YIELD MEAS METHOD  
DATE SAMPLED 02-APR-81 TOTAL DEPTH OF WELL  
TIME SAMPLED 13:21 HOURS SWL ABOVE(-) OR BELOW GS  
LAB + ANALYST MBMG\*FNA CASING DIAMETER  
DATE ANALYZED 27-APR-81 CASING TYPE  
SAMPLE HANDLING 5330 COMPLETION TYPE \*  
METHOD SAMPLED GRAB PERFORATION INTERVAL  
WATER USE DOMESTIC AND STOCK

SAMPLING SITE CLEIV SPRINGS \* 6 MI NE OF FAIRFIELD \*  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L | MEQ/L |                      | MG/L  | MEQ/L |
|----------------|------|-------|----------------------|-------|-------|
| CALCIUM (CA)   | 72.2 | 3.60  | BICARBONATE (HCO3)   | 276.2 | 4.53  |
| MAGNESIUM (MG) | 17.9 | 1.47  | CARBONATE (CO3)      | 0.    |       |
| SODIUM (NA)    | 6.7  | 0.29  | CHLORIDE (CL)        | 2.3   | 0.06  |
| POTASSIUM (K)  | 2.3  | 0.06  | SULFATE (SO4)        | 25.0  | 0.52  |
| IRON (FE)      | .051 | 0.00  | NITRATE (AS N)       | 6.87  | 0.49  |
| MANGANESE (MN) | .004 | 0.00  | FLUORIDE (F)         | .23   | 0.01  |
| SILICA (SIO2)  | 12.5 |       | PHOSPHATE TOT (AS P) |       |       |

TOTAL CATIONS 5.43 TOTAL ANIONS 5.61

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) 1.00

|                             |        |                           |        |
|-----------------------------|--------|---------------------------|--------|
| CALCULATED DISSOLVED SOLIDS | 282.11 | TOTAL HARDNESS AS CaCO3   | 253.96 |
| SUM OF DISS. CONSTITUENT    | 422.26 | TOTAL ALKALINITY AS CaCO3 | 226.53 |
| FIELD CONDUCTVY, MICROMHOS  |        | FIELD ALKALINITY AS CaCO3 | 242.   |
| LAB CONDUCTVY, MICROMHOS    | 548.4  | RYZNAR STABILITY INDEX    | 6.81   |
| FIELD PH                    | 7.22   | LANGLIER SATURATION INDEX | 0.47   |
| LABORATORY PH               | 7.76   | SODIUM ADSORPTION RATIO   | 0.18   |

| PARAMETER                   | VALUE | PARAMETER                   | VALUE |
|-----------------------------|-------|-----------------------------|-------|
| FIELD TEMP. WATER           | 7.0 C |                             |       |
| ALUMINUM, DISS (MG/L-AL)    | <.03  | NICKEL, DISS (MG/L AS NI)   | <.01  |
| SILVER, DISS (MG/L AS AG)   | <.002 | LEAD, DISS (MG/L AS PB)     | <.04  |
| BORON, DISS (MG/L AS B)     | <.02  | STRONTIUM, DISS (MG/L-SR)   | .32   |
| CADMIUM, DISS (MG/L AS CD)  | <.002 | TITANIUM DISS (MG/L AS TI)  | .004  |
| COPPER, DISS (MG/L AS CU)   | <.002 | VANADIUM, DISS (MG/L AS V)  | <.001 |
| LITHIUM, DISS (MG/L AS LI)  | <.002 | ZINC, DISS (MG/L AS ZN)     | <.004 |
| MOLYBDENUM, DISS (MG/L-MO)  | <.02  | ZIRCONIUM DISS (MG/L AS ZR) | <.004 |
| CHROMIUM, DISS (MG/L-CR)    | <.002 | PHOSPHORUS, TOTAL (MG/L-P)  | .003  |
| O-PHOSPHATE, DISS (MG/L-P)  | .003  | SELENIUM, DISS (UG/L-SE)    | .4    |
| NITROGEN, KJEL, TO (MG/L-N) | .96   |                             |       |

REMARKS: SAMPLE TAKEN FROM END OF PIPE COMING FROM OLD CONCRETE STILLING  
WELL 3'-6'-3' ON TOPO AS CLEIV SPRINGS \*

EXPLANATION: MG/L = MILLIGRAMS PER LITER, UG/L = MICROGRAMS PER LITER, MEQ/L =  
MILLIEQUIVALENTS PER LITER, FT = FEET, MT = METERS, (M) = MEASURED, (E) =  
ESTIMATED, (R) = REPORTED, TR = TOTAL RECOVERABLE, TOT = TOTAL.  
BIO = BIOLOGICALLY AVAILABLE.

OTHER AVAILABLE DATA QW WA S2 WI OW PW AT OTHER  
OTHER FILE NUMBERS:

PROJECT: COST:  
LAST EDIT DATE: 09-MAR-84 BY: TP \*BCS  
PROCESSING PROGRAM: F1730P V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
66.4 27.1 5.4 1.1 1.3 10.2 88.5 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 81Q0158

MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 81Q1560

STATE MONTANA COUNTY TETON  
LATITUDE-LONGITUDE 47D41'28"N 111D53'48"W SITE LOCATION 22N 2W 5 ECDD 01  
UTM COORDINATES Z N E MBMG SITE  
TOPOGRAPHIC MAP FAIRFIELD 15' STATION ID 474128111534801  
GEOLOGIC SOURCE 110TRRC\* \* SAMPLE SOURCE SPRING  
DRAINAGE BASIN RD LAND SURFACE ALTITUDE 3858.0 FT < 10  
AGENCY + SAMPLER MBMG\* RAN SUSTAINED YIELD 100.0 GPM  
BOTTLE NUMBER FR#2-98 YIELD MEAS METHOD ESTIMATED  
DATE SAMPLED 02-SEP-81 TOTAL DEPTH OF WELL  
TIME SAMPLED 17:30 HOURS SWL ABOVE(-) OR BELOW GS  
LAB + ANALYST MBMG\*FNA CASING DIAMETER  
DATE ANALYZED 15-OCT-81 CASING TYPE  
SAMPLE HANDLING 4230 COMPLETION TYPE \*  
METHOD SAMPLED GRAB PERFORATION INTERVAL  
WATER USE DOMESTIC AND STOCK

SAMPLING SITE OWNER: SUSSAG, SYLVAN \*  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L | MEQ/L |                      | MG/L | MEQ/L |
|----------------|------|-------|----------------------|------|-------|
| CALCIUM (CA)   | 41.  | 2.05  | BICARBONATE (HCO3)   | 152. | 2.49  |
| MAGNESIUM (MG) | 9.1  | 0.75  | CARBONATE (CO3)      | 0.   |       |
| SODIUM (NA)    | 2.1  | 0.09  | CHLORIDE (CL)        | .7   | 0.02  |
| POTASSIUM (K)  | 2.5  | 0.06  | SULFATE (SO4)        | 24.1 | 0.50  |
| IRON (FE)      | .007 | 0.00  | NITRATE (AS N)       | .42  | 0.03  |
| MANGANESE (MN) | .001 | 0.00  | FLUORIDE (F)         | .2   | 0.01  |
| SILICA (SIO2)  | 5.5  |       | PHOSPHATE TOT (AS P) |      |       |

TOTAL CATIONS 2.95 TOTAL ANIONS 3.05

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) 0.68

|                             |        |                           |        |
|-----------------------------|--------|---------------------------|--------|
| CALCULATED DISSOLVED SOLIDS | 160.50 | TOTAL HARDNESS AS CaCO3   | 139.83 |
| SUM OF DISS. CONSTITUENT    | 237.63 | TOTAL ALKALINITY AS CaCO3 | 124.67 |
| FIELD CONDUCTVY, MICROMHOS  | 270.   | FIELD ALKALINITY AS CaCO3 | 130.0  |
| LAB CONDUCTVY, MICROMHOS    | 296.2  | RYZNAR STABILITY INDEX    | 7.89   |
| FIELD PH                    | 7.05   | LANGLIER SATURATION INDEX | -0.10  |
| LABORATORY PH               | 7.69   | SODIUM ADSORPTION RATIO   | 0.08   |

| PARAMETER                  | VALUE  | PARAMETER                   | VALUE |
|----------------------------|--------|-----------------------------|-------|
| FIELD TEMP. WATER          | 17.0 C |                             |       |
| LITHIUM, DISS (MG/L AS LI) | .008   | DISSOLVD SOLIDS (CALC MG/L) | 161.  |

REMARKS: SPRING FLOWS YEAR AROUND ACCORDING TO OWNER AND HAS FOR 80 YEARS \*

EXPLANATION: MG/L = MILLIGRAMS PER LITER, UG/L = MICROGRAMS PER LITER, MEQ/L = MILLIEQUIVALENTS PER LITER, FT = FEET, MT = METERS, (M) = MEASURED, (E) = ESTIMATED, (R) = REPORTED, TR = TOTAL RECOVERABLE, TOT = TOTAL, BIO = BIOLOGICALLY AVAILABLE.

QW WA S2 WI OW PW AT OTHER

OTHER AVAILABLE DATA  
OTHER FILE NUMBERS:

PROJECT: COST:  
LAST EDIT DATE: 04-FEB-83 BY: TP \*BCS  
PROCESSING PROGRAM: F1730P V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
69.3 25.4 3.1 2.2 0.7 16.7 82.7 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 81Q1560



MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 82Q0249

STATE MONTANA COUNTY TETON  
LATITUDE-LONGITUDE 47D41'28"N 111D53'48"W SITE LOCATION 22N 02W 05\*BCDD 01  
UTM COORDINATES Z N E MBMG SITE  
TOPOGRAPHIC MAP FAIRFIELD 15' STATION ID 474128111534801  
GEOLOGIC SOURCE 110TRRC\* \* SAMPLE SOURCE SPRING  
DRAINAGE BASIN BD LAND SURFACE ALTITUDE 3858.0 FT < 10  
AGENCY + SAMPLER MBMG\*AN SUSTAINED YIELD 4.0 GPM  
BOTTLE NUMBER FAIR 9U YIELD MEAS METHOD STEEL TAPE  
DATE SAMPLED 11-MAY-82 TOTAL DEPTH OF WELL  
TIME SAMPLED 13:00 HOURS SWL ABOVE(-) OR BELOW GS FLOWING (M)  
LAB + ANALYST MBMG\*FNA CASING DIAMETER  
DATE ANALYZED 14-JUL-82 COMPLETION TYPE \*  
SAMPLE HANDLING 4230 PERFORATION INTERVAL  
METHOD SAMPLED GRAB  
WATER USE DOMESTIC AND STOCK

SAMPLING SITE CLEIV SPRINGS \* OWNER: SUSSAG, SYLVAN  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L  | MEQ/L |                      | MG/L | MEQ/L |
|----------------|-------|-------|----------------------|------|-------|
| CALCIUM (CA)   | 94.3  | 4.71  | BICARBONATE (HCO3)   | 271. | 4.44  |
| MAGNESIUM (MG) | 25.8  | 2.12  | CARBONATE (CO3)      | .0   |       |
| SODIUM (NA)    | 21.1  | 0.92  | CHLORIDE (CL)        | 14.4 | 0.41  |
| POTASSIUM (K)  | 3.3   | 0.08  | SULFATE (SO4)        | 110. | 2.29  |
| IRON (FE)      | <.002 |       | NITRATE (AS N)       | 4.27 | 0.30  |
| MANGANESE (MN) | .001  | 0.00  | FLUORIDE (F)         | .36  | 0.02  |
| SILICA (SIO2)  | 6.7   |       | PHOSPHATE TOT (AS P) |      |       |

TOTAL CATIONS 7.83 TOTAL ANIONS 7.46

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) -1.70

|                             |        |                           |        |
|-----------------------------|--------|---------------------------|--------|
| CALCULATED DISSOLVED SOLIDS | 413.73 | TOTAL HARDNESS AS CaCO3   | 341.66 |
| SUM OF DISS. CONSTITUENT    | 551.23 | TOTAL ALKALINITY AS CaCO3 | 222.27 |
| FIELD CONDUCTVY, MICROMHOS  | 750.   | FIELD ALKALINITY AS CaCO3 | 226.0  |
| LAB CONDUCTVY, MICROMHOS    | 684.7  | RYZMAR STABILITY INDEX    | 6.50   |
| FIELD PH                    | 7.75   | LANGLIER SATURATION INDEX | 0.68   |
| LABORATORY PH               | 7.86   | SODIUM ADSORPTION RATIO   | 0.50   |

| PARAMETER                  | VALUE  | PARAMETER                   | VALUE |
|----------------------------|--------|-----------------------------|-------|
| FIELD TEMP. AIR            | 15.0 C | FIELD TEMP. WATER           | 7.0 C |
| LITHIUM, DISS (MG/L AS LI) | .063   | DISSOLVD SOLIDS (CALC MG/L) | 414.  |

REMARKS: SPRING FLOWS YEAR AROUND ACCORDING TO OWNER AND HAS FOR 80 YEARS\*  
SAMPLED FROM PIPE OUT OF STILLING WELL AT CLEIV SPRINGS\*  
LAB: REPEATED ANALYSIS GIVES POOR SIGMA. SAMPLE NOT STABLE

EXPLANATION: MG/L = MILLIGRAMS PER LITER, UG/L = MICROGRAMS PER LITER, MEQ/L =  
MILLIEQUIVALENTS PER LITER, FT = FEET, MT = METERS, (M) = MEASURED, (E) =  
ESTIMATED, (R) = REPORTED, TR = TOTAL RECOVERABLE, TOT = TOTAL.  
BIO = BIOLOGICALLY AVAILABLE.

OTHER AVAILABLE DATA QW NA S2 WJ OW PW AT OTHER  
OTHER FILE NUMBERS: Y

PROJECT: COST:  
LAST EDIT DATE: 23-SEP-83 BY: TP \*JKS  
PROCESSING PROGRAM: F1730P V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
60.1 27.1 11.7 1.1 5.7 32.1 62.2 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 82Q0249



MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 81Q0151

STATE MONTANA COUNTY TETON  
LATITUDE-LONGITUDE 47D40'30"N 111D50'11"W SITE LOCATION 22N 2W 11 CBBB  
UTM COORDINATES Z N E MEMG SITE  
TOPOGRAPHIC MAP FAIRFIELD 15' STATION ID 474030111501101  
GEOLOGIC SOURCE 110TRRC\* \* \* SAMPLE SOURCE WELL  
DRAINAGE BASIN BD LAND SURFACE ALTITUDE 3835. FT < 1.  
AGENCY + SAMPLER MEMG\*AN SUSTAINED YIELD  
BOTTLE NUMBER FAIR 2 YIELD MEAS METHOD  
DATE SAMPLED 01-APR-81 TOTAL DEPTH OF WELL 12.8 FT (M)  
TIME SAMPLED 15:11 HOURS SWL ABOVE(-) OR BELOW GS 11.44 FT (M)  
LAB + ANALYST MEMG\*FNA CASING DIAMETER 18 IN (M)  
DATE ANALYZED 27-APR-81 CASING TYPE CULVERT  
SAMPLE HANDLING 5330 COMPLETION TYPE 01\*  
METHOD SAMPLED PUMPED PERFORATION INTERVAL  
WATER USE DOMESTIC AND STOCK

SAMPLING SITE WINTER, JOHN \* 8 MI NE OF FAIRFIELD \*  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L  | MEQ/L |                      | MG/L | MEQ/L |
|----------------|-------|-------|----------------------|------|-------|
| CALCIUM (CA)   | 40.9  | 2.04  | BICARBONATE (HCO3)   | 354. | 5.80  |
| MAGNESIUM (MG) | 61.4  | 5.05  | CARBONATE (CO3)      | 0.   |       |
| SODIUM (NA)    | 55.2  | 2.40  | CHLORIDE (CL)        | 6.2  | 0.17  |
| POTASSIUM (K)  | .6    | 0.02  | SULFATE (SO4)        | 154. | 3.21  |
| IRON (FE)      | .052  | 0.00  | NITRATE (AS N)       | 3.75 | 0.27  |
| MANGANESE (MN) | <.001 |       | FLUORIDE (F)         | .83  | 0.04  |
| SILICA (SIO2)  | 11.5  |       | PHOSPHATE TOT (AS P) |      |       |

TOTAL CATIONS 9.51 TOTAL ANIONS 9.49

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) -0.07

| CALCULATED DISSOLVED SOLIDS | 508.82 | TOTAL HARDNESS AS CaCO3   | 354.85 |
|-----------------------------|--------|---------------------------|--------|
| SUM OF DISS. CONSTITUENT    | 488.43 | TOTAL ALKALINITY AS CaCO3 | 290.34 |
| FIELD CONDUCTVY, MICROMHOS  |        | FIELD ALKALINITY AS CaCO3 | 224.0  |
| LAB CONDUCTVY, MICROMHOS    | 896.2  | RYZNAR STABILITY INDEX    | 7.04   |
| FIELD PH                    | 7.36   | LANGLIER SATURATION INDEX | 0.38   |
| LABORATORY PH               | 7.81   | SODIUM ADSORPTION RATIO   | 1.28   |

| PARAMETER                   | VALUE | PARAMETER                  | VALUE |
|-----------------------------|-------|----------------------------|-------|
| FIELD TEMP. WATER           | 8.0 C |                            |       |
| ALUMINUM, DISS (MG/L-AL)    | <.03  | NICKEL, DISS (MG/L AS NI)  | <.01  |
| SILVER, DISS (MG/L AS AG)   | <.002 | LEAD, DISS (MG/L AS PB)    | <.04  |
| BORON, DISS (MG/L AS B)     | <.02  | STRONTIUM, DISS (MG/L-SR)  | .857  |
| CADMIUM, DISS (MG/L AS CD)  | <.002 | TITANIUM DIS (MG/L AS TI)  | .005  |
| COPPER, DISS (MG/L AS CU)   | <.002 | VANADIUM, DISS (MG/L AS V) | <.001 |
| LITHIUM, DISS (MG/L AS LI)  | .043  | ZINC, DISS (MG/L AS ZN)    | .043  |
| MOLYBDENUM, DISS (MG/L-MO)  | <.02  | ZIRCONIUM DIS (MG/L AS ZR) | <.004 |
| CHROMIUM, DISS (MG/L-CR)    | <.002 | PHOSPHORUS, TOTAL (MG/L-P) | .003  |
| O-PHOSPHATE, DISS (MG/L-P)  | <.003 | SELENIUM, DISS (UG/L-SE)   | 3.1   |
| NITROGEN, KJEL, TO (MG/L-N) | <.1   |                            |       |

EXPLANATION: MG/L = MILLIGRAMS PER LITER; UG/L = MICROGRAMS PER LITER; MEQ/L = MILLIEQUIVELENTS PER LITER. FT = FEET, MT = METERS. (M) = MEASURED, (E) = ESTIMATED, (R) = REPORTED. TR = TOTAL RECOVERABLE. TOT = TOTAL. BIO = BIOLOGICALLY AVAILABLE.

OTHER AVAILABLE DATA QW WA S2 WI OW PW AT OTHER  
OTHER FILE NUMBERS:

PROJECT: COST:  
LAST EDIT DATE: 09-MAR-84 BY: TP \*BCS  
PROCESSING PROGRAM: F1730F V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
21.5 53.1 25.3 0.2 1.9 34.9 63.2 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 81Q0151



MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 81Q1553

STATE MONTANA COUNTY TETON  
LATITUDE-LONGITUDE 47D40'29"N 111D50'10"W SITE LOCATION 22N 2W 11 CBBB  
UTM COORDINATES Z N E MBMG SITE  
TOPOGRAPHIC MAP FAIRFIELD 15' STATION ID 474029111501001  
GEOLOGIC SOURCE 110TRRC\* \* SAMPLE SOURCE WELL  
DRAINAGE BASIN BD LAND SURFACE ALTITUDE  
AGENCY + SAMPLER MBMG\*RAM SUSTAINED YIELD  
BOTTLE NUMBER FR#2-2S YIELD MEAS METHOD  
DATE SAMPLED 03-SEP-81 TOTAL DEPTH OF WELL 12.8 FT  
TIME SAMPLED 11:00 HOURS SWL ABOVE(-) OR BELOW GS 4.76 FT (M)  
LAB + ANALYST MBMG\*FNA CASING DIAMETER 18 IN (M)  
DATE ANALYZED 12-OCT-81 CASING TYPE CULVERT  
SAMPLE HANDLING 4230 COMPLETION TYPE 01\*  
METHOD SAMPLED PUMPED PERFORATION INTERVAL  
WATER USE DOMESTIC

SAMPLING SITE WINTER, JOHN : 8 MI NE OF FAIRFIELD \*  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L  | MEQ/L |                      | MG/L | MEQ/L |
|----------------|-------|-------|----------------------|------|-------|
| CALCIUM (CA)   | 43.3  | 2.16  | BICARBONATE (HCO3)   | 407. | 6.67  |
| MAGNESIUM (MG) | 60.9  | 5.01  | CARBONATE (CO3)      | 0.   |       |
| SODIUM (NA)    | 49.3  | 2.14  | CHLORIDE (CL)        | 12.8 | 0.36  |
| POTASSIUM (K)  | .8    | 0.02  | SULFATE (SO4)        | 98.8 | 2.06  |
| IRON (FE)      | <.002 |       | NITRATE (AS N)       | 4.9  | 0.35  |
| MANGANESE (MN) | .001  | 0.00  | FLUORIDE (F)         | .85  | 0.04  |
| SILICA (SiO2)  | 12.9  |       | PHOSPHATE TOT (AS P) |      |       |

TOTAL CATIONS 9.34 TOTAL ANIONS 9.48

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) 0.61

|                             |        |                           |        |
|-----------------------------|--------|---------------------------|--------|
| CALCULATED DISSOLVED SOLIDS | 485.04 | TOTAL HARDNESS AS CaCO3   | 358.78 |
| SUM OF DISS. CONSTITUENT    | 691.55 | TOTAL ALKALINITY AS CaCO3 | 333.81 |
| FIELD CONDUCTVY, MICROMHOS  | 815.   | FIELD ALKALINITY AS CaCO3 | 360.0  |
| LAB CONDUCTVY, MICROMHOS    | 777.   | RYZNAR STABILITY INDEX    | 6.56   |
| FIELD PH                    | 6.95   | LANGLIER SATURATION INDEX | 0.78   |
| LABORATORY PH               | 8.12   | SODIUM ADSORPTION RATIO   | 1.13   |

| PARAMETER                  | VALUE  | PARAMETER                   | VALUE |
|----------------------------|--------|-----------------------------|-------|
| FIELD TEMP. WATER          | 12.0 C |                             |       |
| LITHIUM, DISS (MG/L AS LI) | .051   | DISSOLVD SOLIDS (CALC MG/L) | 485.  |

REMARKS: THERE IS A MOAT AROUND THE HOUSE \*

EXPLANATION: MG/L = MILLIGRAMS PER LITER, UG/L = MICROGRAMS PER LITER, MEQ/L = MILLIEQUIVALENTS PER LITER, FT = FEET, MT = METERS, (M) = MEASURED, (E) = ESTIMATED, (R) = REPORTED, TR = TOTAL RECOVERABLE, TOT = TOTAL, BIO = BIOLOGICALLY AVAILABLE.

OTHER AVAILABLE DATA QW WA S2 WI OW PW AT OTHER  
OTHER FILE NUMBERS:

PROJECT: COST:  
LAST EDIT DATE: 04-FEB-83 BY: TP \*BCS  
PROCESSING PROGRAM: F1730P V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
23.1 53.7 23.0 0.2 4.0 22.6 73.4 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 81Q1553



MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 81Q1835

STATE MONTANA COUNTY TETON  
LATITUDE-LONGITUDE 47D40'05"N 111D50'12"W SITE LOCATION 22N 02W 14 BRBB  
UTM COORDINATES Z N E MBMG SITE  
TOPOGRAPHIC MAP FAIRFIELD 15' STATION ID 474005111501201  
GEOLOGIC SOURCE 110TRRC\* \* SAMPLE SOURCE WELL  
DRAINAGE BASIN RD LAND SURFACE ALTITUDE 3833.0 FT < 10  
AGENCY + SAMPLER MBMG\*LAN SUSTAINED YIELD  
BOTTLE NUMBER VEVERICK YIELD MEAS METHOD  
DATE SAMPLED 06-OCT-81 TOTAL DEPTH OF WELL 20.0 FT (M)  
TIME SAMPLED 15:30 HOURS SWL ABOVE(-) OR BELOW GS 4.00 FT  
LAB + ANALYST MBMG\*FNA CASING DIAMETER 5 IN (M)  
DATE ANALYZED 18-NOV-81 CASING TYPE PVC  
SAMPLE HANDLING 3120 COMPLETION TYPE 03\*01  
METHOD SAMPLED BAILED PERFORATION INTERVAL 5 TO 15 FT (M)  
WATER USE DOMESTIC AND STOCK

SAMPLING SITE VEVERICK TEST-PROD WELL #7 MI NE FAIRFIELD  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L | MEQ/L |                      | MG/L  | MEQ/L |
|----------------|------|-------|----------------------|-------|-------|
| CALCIUM (CA)   | 49.6 | 2.48  | BICARBONATE (HCO3)   | 403.8 | 6.62  |
| MAGNESIUM (MG) | 62.2 | 5.12  | CARBONATE (CO3)      | 0.0   |       |
| SODIUM (NA)    | 130. | 5.65  | CHLORIDE (CL)        | 16.0  | 0.45  |
| POTASSIUM (K)  | 3.8  | 0.10  | SULFATE (SO4)        | 293.  | 6.10  |
| IRON (FE)      | .098 | 0.01  | NITRATE (AS N)       | 4.40  | 0.31  |
| MANGANESE (MN) | .20  | 0.01  | FLUORIDE (F)         | 1.16  | 0.06  |
| SILICA (SI02)  | 11.9 |       | PHOSPHATE TOT (AS P) |       |       |

TOTAL CATIONS 13.36 TOTAL ANIONS 13.54

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) 0.62

|                             |        |                           |        |
|-----------------------------|--------|---------------------------|--------|
| CALCULATED DISSOLVED SOLIDS | 771.27 | TOTAL HARDNESS AS CaCO3   | 379.87 |
| SUM OF DISS. CONSTITUENT    | 976.16 | TOTAL ALKALINITY AS CaCO3 | 331.19 |
| FIELD CONDUCTVY, MICROMHOS  | 1233.  | FIELD ALKALINITY AS CaCO3 |        |
| LAB CONDUCTVY, MICROMHOS    | 1214.  | RYZNAR STABILITY INDEX    | 6.47   |
| FIELD PH                    | 7.90   | LANGLIER SATURATION INDEX | 0.82   |
| LABORATORY PH               | 8.10   | SODIUM ADSORPTION RATIO   | 2.90   |

| PARAMETER                   | VALUE  | PARAMETER                    | VALUE  |
|-----------------------------|--------|------------------------------|--------|
| FIELD TEMP. AIR             | 48.0 F | FIELD TEMP. WATER            | 13.0 F |
| ALUMINUM, DISS (MG/L-AL)    | <.03   | NICKEL, DISS (MG/L AS NI)    | <.01   |
| SILVER, DISS (MG/L AS AG)   | <.002  | LEAD, DISS (MG/L AS PB)      | <.04   |
| BORON, DISS (MG/L AS B)     | <.02   | STRONTIUM, DISS (MG/L-SR)    | .77    |
| CADMIUM, DISS (MG/L AS CD)  | <.002  | TITANIUM, DISS (MG/L AS TI)  | <.001  |
| CHROMIUM, DISS (MG/L-CR)    | <.002  | VANADIUM, DISS (MG/L AS V)   | <.001  |
| COPPER, DISS (MG/L AS CU)   | <.002  | ZINC, DISS (MG/L AS ZN)      | .35    |
| LITHIUM, DISS (MG/L AS LI)  | .061   | ZIRCONIUM, DISS (MG/L AS ZR) | <.003  |
| MOLYBDENUM, DISS (MG/L-MO)  | <.02   | SELENIUM, DISS (UG/L-SE)     | 5.0    |
| DISSOLVD SOLIDS (CALC MG/L) | 771.   |                              |        |

REMARKS: SAMPLE WAS TAKEN AT THE GRAVEL-SHALE INTERFACE  
MBMG TEST WELL FOR DETERMINING AQUIFER CHARACTERISTICS \* MAY BE REMOVED  
AFTER PROJECT IS COMPLETE \* WELL WAS NOT DEVELOPED WHEN SAMPLE TAKEN \*  
LAB: FU, CA 51.8 MG/L \* MG 67.1 MG/L \* NA 139.4 MG/L

EXPLANATION: MG/L = MILLIGRAMS PER LITER, UG/L = MICROGRAMS PER LITER, MEQ/L =  
MILLIEQUIVALENTS PER LITER, FT = FEET, M = METERS, (M) = MEASURED, (E) =  
ESTIMATED, (R) = REPORTED, TR = TOTAL RECOVERABLE, TOT = TOTAL,  
BIO = BIOLOGICALLY AVAILABLE.

OTHER AVAILABLE DATA QW WA S2 WI OW PW AT OTHER  
OTHER FILE NUMBERS:

PROJECT: COST:  
LAST EDIT DATE: 08-FEB-83 BY: JKS\*JKS  
PROCESSING PROGRAM: F1730P V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
18.5 38.3 42.4 0.7 3.4 46.3 50.3 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 81Q1835



MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 81Q0157

STATE MONTANA COUNTY TETON  
LATITUDE-LONGITUDE 47D39'12"N 111D53'41"W SITE LOCATION 22N 2W 20 BARA  
UTM COORDINATES Z N E MBMG SITE  
TOPOGRAPHIC MAP FAIRFIELD 15' STATION ID 473912111534101  
GEOLOGIC SOURCE 110TRRC\* \* SAMPLE SOURCE WELL  
DRAINAGE BASIN BN LAND SURFACE ALTITUDE 3892.0 FT < 1.  
AGENCY + SAMPLER MBMG\*RAM SUSTAINED YIELD  
BOTTLE NUMBER FAIR 8 YIELD MEAS METHOD  
DATE SAMPLED 02-APR-81 TOTAL DEPTH OF WELL 13.3 FT (M)  
TIME SAMPLED 12:59 HOURS SWL ABOVE(-) OR BELOW GS 10.87 FT (M)  
LAB + ANALYST MBMG\*FNA CASING DIAMETER 6 IN (M)  
DATE ANALYZED 13-MAY-81 CASING TYPE STEEL  
SAMPLE HANDLING 5330 COMPLETION TYPE 01\*  
METHOD SAMPLED PUMPED PERFORATION INTERVAL  
WATER USE DOMESTIC AND STOCK

SAMPLING SITE ROBERT SHROCK \* 5 MI NE OF FAIRFIELD MT \*  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L  | MEQ/L |                      | MG/L | MEQ/L |
|----------------|-------|-------|----------------------|------|-------|
| CALCIUM (CA)   | 57.9  | 2.89  | BICARBONATE (HCO3)   | 304. | 4.98  |
| MAGNESIUM (MG) | 28.8  | 2.37  | CARBONATE (CO3)      | 0.0  |       |
| SODIUM (NA)    | 15.8  | 0.69  | CHLORIDE (CL)        | 2.2  | 0.06  |
| POTASSIUM (K)  | <.1   |       | SULFATE (SO4)        | 50.3 | 1.05  |
| IRON (FE)      | .010  | 0.00  | NITRATE (AS N)       | .10  | 0.01  |
| MANGANESE (MN) | <.001 |       | FLUORIDE (F)         | .36  | 0.02  |
| SILICA (SIO2)  | 8.3   |       | PHOSPHATE TOT (AS P) |      |       |

TOTAL CATIONS 5.95 TOTAL ANIONS 6.12

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) 0.88

|                             |        |                           |        |
|-----------------------------|--------|---------------------------|--------|
| CALCULATED DISSOLVED SOLIDS | 313.52 | TOTAL HARDNESS AS CaCO3   | 263.12 |
| SUM OF DISS. CONSTITUENT    | 467.77 | TOTAL ALKALINITY AS CaCO3 | 249.33 |
| FIELD CONDUCTVY, MICROMHOS  | 579.   | FIELD ALKALINITY AS CaCO3 | 264.0  |
| LAB CONDUCTVY, MICROMHOS    | 592.6  | RYZMAR STABILITY INDEX    | 7.09   |
| FIELD PH                    | 7.03   | LANGLIER SATURATION INDEX | 0.25   |
| LABORATORY PH               | 7.59   | SODIUM ADSORPTION RATIO   | 0.42   |

| PARAMETER                  | VALUE | PARAMETER                    | VALUE |
|----------------------------|-------|------------------------------|-------|
| FIELD TEMP. WATER          | 5.0 C |                              |       |
| ALUMINUM, DISS (MG/L-AL)   | <.03  | NICKEL, DISS (MG/L AS NI)    | .01   |
| SILVER, DISS (MG/L AS AG)  | <.002 | LEAD, DISS (MG/L AS PB)      | <.04  |
| BORON, DISS (MG/L AS B)    | <.02  | STRONTIUM, DISS (MG/L-SR)    | .52   |
| CADMIUM, DISS (MG/L AS CD) | <.002 | TITANIUM, DISS (MG/L AS TI)  | <.001 |
| CHROMIUM, DISS (MG/L-CR)   | <.002 | VANADIUM, DISS (MG/L AS V)   | <.001 |
| COPPER, DISS (MG/L AS CU)  | <.002 | ZINC, DISS (MG/L AS ZN)      | .025  |
| LITHIUM, DISS (MG/L AS LI) | .009  | ZIRCONIUM, DISS (MG/L AS ZR) | <.004 |
| MOLYBDENUM, DISS (MG/L-MO) | <.02  | SELENIUM, DISS (UG/L-SE)     | .5    |
| PHOSPHORUS, TOTAL (MG/L-P) | <.003 | O-PHOSPHATE, DISS (MG/L-P)   | <.003 |

REMARKS: OWNER: ROBERT SHROCK \*

EXPLANATION: MG/L = MILLIGRAMS PER LITER, UG/L = MICROGRAMS PER LITER, MEQ/L =  
MILLIEQUIVALENTS PER LITER. FT = FEET, MT = METERS. (M) = MEASURED, (E) =  
ESTIMATED, (R) = REPORTED. TR = TOTAL RECOVERABLE. TOT = TOTAL.  
BIO = BIOLOGICALLY AVAILABLE.

QW WA S2 WI OW PW AT OTHER

OTHER AVAILABLE DATA  
OTHER FILE NUMBERS:

PROJECT: COST:  
LAST EDIT DATE: 22-NOV-83 BY: TP \*BCS  
PROCESSING PROGRAM: F1730P V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
48.6 39.8 11.6 0.0 1.0 17.2 81.8 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 81Q0157

MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 81Q1559

|                                           |                                      |
|-------------------------------------------|--------------------------------------|
| STATE MONTANA                             | COUNTY TETON                         |
| LATITUDE-LONGITUDE 47°39'14"N 111°53'39"W | SITE LOCATION 22N 2W 20 BABA 01      |
| UTM COORDINATES Z N E                     | MBMG SITE                            |
| TOPOGRAPHIC MAP FAIRFIELD 15'             | STATION ID 473914111533901           |
| GEOLOGIC SOURCE 110TRRC*                  | * SAMPLE SOURCE WELL                 |
| DRAINAGE BASIN BD                         | LAND SURFACE ALTITUDE 3892.0 FT < 10 |
| AGENCY + SAMPLER MBMG*RAM                 | SUSTAINED YIELD                      |
| BOTTLE NUMBER FR#2-88                     | YIELD MEAS METHOD                    |
| DATE SAMPLED 02-SEP-81                    | TOTAL DEPTH OF WELL 13.3 FT (M)      |
| TIME SAMPLED 16:55 HOURS                  | SWL ABOVE(-) OR BELOW GS 8.00 FT (M) |
| LAB + ANALYST MBMG*FNA                    | CASING DIAMETER 6 IN (M)             |
| DATE ANALYZED 15-OCT-81                   | CASING TYPE STEEL                    |
| SAMPLE HANDLING 4230                      | COMPLETION TYPE 01*                  |
| METHOD SAMPLED PUMPED                     | PERFORATION INTERVAL                 |
| WATER USE                                 |                                      |

SAMPLING SITE SCHROCK, ROBERT: 5 MI NE OF FAIRFIELD \*  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L | MEQ/L |                      | MG/L | MEQ/L |
|----------------|------|-------|----------------------|------|-------|
| CALCIUM (CA)   | 68.6 | 3.42  | BICARBONATE (HCO3)   | 366. | 6.00  |
| MAGNESIUM (MG) | 35.5 | 2.92  | CARBONATE (CO3)      | 0.   |       |
| SODIUM (NA)    | 24.2 | 1.05  | CHLORIDE (CL)        | 4.8  | 0.14  |
| POTASSIUM (K)  | .5   | 0.01  | SULFATE (SO4)        | 70.2 | 1.46  |
| IRON (FE)      | .008 | 0.00  | NITRATE (AS N)       | .12  | 0.01  |
| MANGANESE (MN) | .004 | 0.00  | FLUORIDE (F)         | .5   | 0.03  |
| SILICA (SIO2)  | 10.3 |       | PHOSPHATE TOT (AS P) |      |       |

TOTAL CATIONS 7.41 TOTAL ANIONS 7.63

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) 1.02

|                             |        |                           |        |
|-----------------------------|--------|---------------------------|--------|
| CALCULATED DISSOLVED SOLIDS | 395.03 | TOTAL HARDNESS AS CAC03   | 317.41 |
| SUM OF DISS. CONSTITUENT    | 580.73 | TOTAL ALKALINITY AS CAC03 | 300.18 |
| FIELD CONDUCTVY, MICROMHOS  | 635.   | FIELD ALKALINITY AS CAC03 | 310.0  |
| LAB CONDUCTVY, MICROMHOS    | 674.3  | RYZNAR STABILITY INDEX    | 6.54   |
| FIELD PH                    | 6.88   | LANGLIER SATURATION INDEX | 0.64   |
| LABORATORY PH               | 7.83   | SODIUM ADSORPTION RATIO   | 0.59   |

| PARAMETER                  | VALUE  | PARAMETER                  | VALUE |
|----------------------------|--------|----------------------------|-------|
| FIELD TEMP. WATER          | 12.0 C |                            |       |
| LITHIUM, DISS (MG/L AS LI) | .03    | DISSOLVD SOLIDS (CALC MG/L | 395.  |

EXPLANATION: MG/L = MILLIGRAMS PER LITER, UG/L = MICROGRAMS PER LITER, MEQ/L = MILLIEQUIVALENTS PER LITER, FT = FEET, MT = METERS, (M) = MEASURED, (E) = ESTIMATED, (R) = REPORTED, TR = TOTAL RECOVERABLE, TOT = TOTAL, BIO = BIOLOGICALLY AVAILABLE.

OTHER AVAILABLE DATA QW WA S2 WI OW PW AT OTHER  
OTHER FILE NUMBERS:

PROJECT: COST:  
LAST EDIT DATE: 04-FEB-83 BY: TP \*BCS  
PROCESSING PROGRAM: F1730P V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
46.2 39.4 14.2 0.2 1.8 19.2 79.0 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 81Q1559



MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 82Q0248

STATE MONTANA COUNTY TETON  
LATITUDE-LONGITUDE 47D39'14"N 111D53'39"W SITE LOCATION 22N 2W 20\*BABA 01  
UTM COORDINATES Z N E MBMG SITE  
TOPOGRAPHIC MAP FAIRFIELD 15' STATION ID 473914111533901  
GEOLOGIC SOURCE 110TRRC\* \* SAMPLE SOURCE WELL  
DRAINAGE BASIN BD LAND SURFACE ALTITUDE 3892.0 FT < 10  
AGENCY + SAMPLER MBMG\*RAM SUSTAINED YIELD  
BOTTLE NUMBER FAIR 8U YIELD MEAS METHOD  
DATE SAMPLED 11-MAY-82 TOTAL DEPTH OF WELL 13.3 FT (M)  
TIME SAMPLED 14:15 HOURS SWL ABOVE(-) OR BELOW GS 10.53 FT (M)  
LAB + ANALYST MBMG\*FNA CASING DIAMETER 6 IN (M)  
DATE ANALYZED 06-JUL-82 CASING TYPE STEEL  
SAMPLE HANDLING 4230 COMPLETION TYPE 01\*  
METHOD SAMPLED PUMPED PERFORATION INTERVAL  
WATER USE DOMESTIC

SAMPLING SITE SCHROCK, ROBERT\*5 MI NE OF FAIRFIELD  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L  | MEQ/L |                      | MG/L | MEQ/L |
|----------------|-------|-------|----------------------|------|-------|
| CALCIUM (CA)   | 58.9  | 2.94  | BICARBONATE (HCO3)   | 289. | 4.74  |
| MAGNESIUM (MG) | 28.8  | 2.37  | CARBONATE (CO3)      | .0   |       |
| SODIUM (NA)    | 14.3  | 0.62  | CHLORIDE (CL)        | 1.5  | 0.04  |
| POTASSIUM (K)  | .3    | 0.01  | SULFATE (SO4)        | 57.7 | 1.20  |
| IRON (FE)      | <.002 |       | NITRATE (AS N)       | .05  | 0.00  |
| MANGANESE (MN) | <.001 |       | FLUORIDE (F)         | .46  | 0.02  |
| SILICA (SIO2)  | 7.5   |       | PHOSPHATE TOT (AS P) |      |       |

TOTAL CATIONS 5.94 TOTAL ANIONS 6.01

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) 0.36

|                             |        |                           |        |
|-----------------------------|--------|---------------------------|--------|
| CALCULATED DISSOLVED SOLIDS | 311.87 | TOTAL HARDNESS AS CaCO3   | 265.61 |
| SUM OF DISS. CONSTITUENT    | 458.51 | TOTAL ALKALINITY AS CaCO3 | 237.03 |
| FIELD CONDUCTVY, MICROMHOS  | 580.   | FIELD ALKALINITY AS CaCO3 | 242.0  |
| LAB CONDUCTVY, MICROMHOS    | 522.0  | RYZNAR STABILITY INDEX    | 7.07   |
| FIELD PH                    | 7.50   | LANGLIER SATURATION INDEX | 0.28   |
| LABORATORY PH               | 7.64   | SODIUM ADSORPTION RATIO   | 0.38   |

|                            |        |                             |       |
|----------------------------|--------|-----------------------------|-------|
| PARAMETER                  | VALUE  | PARAMETER                   | VALUE |
| FIELD TEMP. AIR            | 17.0 C | FIELD TEMP. WATER           | 6.5 C |
| LITHIUM, DISS (MG/L AS LI) | .014   | DISSOLVD SOLIDS (CALC MG/L) | 312.  |

REMARKS: OWNER: ROBERT SHROCK

EXPLANATION: MG/L = MILLIGRAMS PER LITER; UG/L = MICROGRAMS PER LITER; MEQ/L = MILLIEQUIVALENTS PER LITER. FT = FEET, M = METERS. (M) = MEASURED; (E) = ESTIMATED; (R) = REPORTED. TR = TOTAL RECOVERABLE. TOT = TOTAL. BIO = BIOLOGICALLY AVAILABLE.

OTHER AVAILABLE DATA QW WA S2 W1 QW PW AT OTHER  
Y  
OTHER FILE NUMBERS:

PROJECT: COST:  
LAST EDIT DATE: 23-SEP-83 BY: TP \*JKS  
PROCESSING PROGRAM: F1730P V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
49.5 39.9 10.5 0.1 0.7 20.1 79.2 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 82Q0248

MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 81Q0152

STATE MONTANA COUNTY TETON  
LATITUDE-LONGITUDE 47D37'55"N 111D50'10"W SITE LOCATION 22N 2W 26 CBBB  
UTM COORDINATES Z N E MBMG SITE  
TOPOGRAPHIC MAP FAIRFIELD 15' STATION ID 473755111501001  
GEOLOGIC SOURCE 110TRRC\* \* \* SAMPLE SOURCE WELL  
DRAINAGE BASIN BD LAND SURFACE ALTITUDE 3924.0 FT < 1.  
AGENCY + SAMPLER MBMG\*LAN SUSTAINED YIELD  
BOTTLE NUMBER FAIR 3 YIELD MEAS METHOD  
DATE SAMPLED 01-APR-81 TOTAL DEPTH OF WELL 19.8 (M)  
TIME SAMPLED 17:00 HOURS SWL ABOVE(-) OR BELOW GS 9.50 FT (M)  
LAB + ANALYST MBMG\*FNA CASING DIAMETER 6 IN (M)  
DATE ANALYZED 13-MAY-81 CASING TYPE STEEL  
SAMPLE HANDLING 5330 COMPLETION TYPE 01\*  
METHOD SAMPLED PUMPED PERFORATION INTERVAL  
WATER USE DOMESTIC AND STOCK

SAMPLING SITE OSTERG, RON \* APPROX 7 MI ENE OF FAIRFIELD\*  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L  | MEQ/L |                      | MG/L | MEQ/L |
|----------------|-------|-------|----------------------|------|-------|
| CALCIUM (CA)   | 32.9  | 1.64  | BICARBONATE (HCO3)   | 382. | 6.26  |
| MAGNESIUM (MG) | 65.8  | 3.41  | CARBONATE (CO3)      | .0   |       |
| SODIUM (NA)    | 46.3  | 2.01  | CHLORIDE (CL)        | 32.5 | 0.92  |
| POTASSIUM (K)  | .8    | 0.02  | SULFATE (SO4)        | 72.7 | 1.51  |
| IRON (FE)      | .036  | 0.00  | NITRATE (AS N)       | 6.26 | 0.45  |
| MANGANESE (MN) | <.001 |       | FLUORIDE (F)         | .90  | 0.05  |
| SILICA (SI02)  | 10.6  |       | PHOSPHATE TOT (AS P) |      |       |

TOTAL CATIONS 9.09 TOTAL ANIONS 9.19

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) 0.39

|                             |        |                           |        |
|-----------------------------|--------|---------------------------|--------|
| CALCULATED DISSOLVED SOLIDS | 456.97 | TOTAL HARDNESS AS CaCO3   | 352.98 |
| SUM OF DISS. CONSTITUENT    | 650.80 | TOTAL ALKALINITY AS CaCO3 | 313.31 |
| FIELD CONDUCTVY, MICROMHOS  |        | FIELD ALKALINITY AS CaCO3 | 346.0  |
| LAB CONDUCTVY, MICROMHOS    | 855.1  | RYZNAR STABILITY INDEX    | 7.12   |
| FIELD PH                    | 6.94   | LANGLIER SATURATION INDEX | 0.36   |
| LABORATORY PH               | 7.85   | SODIUM ADSORPTION RATIO   | 1.07   |

| PARAMETER                  | VALUE | PARAMETER                    | VALUE |
|----------------------------|-------|------------------------------|-------|
| FIELD TEMP. WATER          | 9.0 C |                              |       |
| ALUMINUM, DISS (MG/L-AL)   | <.03  | NICKEL, DISS (MG/L AS NI)    | <.01  |
| SILVER, DISS (MG/L AS AG)  | <.002 | LEAD, DISS (MG/L AS PB)      | <.04  |
| BORON, DISS (MG/L AS B)    | .02   | STRONTIUM, DISS (MG/L-SR)    | .73   |
| CADMIUM, DISS (MG/L AS CD) | <.002 | TITANIUM, DISS (MG/L AS TI)  | .005  |
| CHROMIUM, DISS (MG/L-CR)   | <.002 | VANADIUM, DISS (MG/L AS V)   | <.001 |
| COPPER, DISS (MG/L AS CU)  | <.002 | ZINC, DISS (MG/L AS ZN)      | <.004 |
| LITHIUM, DISS (MG/L AS LI) | .042  | ZIRCONIUM, DISS (MG/L AS ZR) | <.004 |
| MOLYBDENUM, DISS (MG/L-MO) | <.02  | SELENIUM, DISS (UG/L-SE)     | 2.2   |
| PHOSPHORUS, TOTAL (MG/L-P) | <.003 | CARBON, TOT, ORG. (MG/L-C)   | 6.9   |
| O-PHOSPHATE, DISS (MG/L-P) | <.003 | NITROGEN, KJEL, TO (MG/L-N)  | .1    |

REMARKS: WELL IS COVERED BY A 4 FT SQ CONCRETE PAD WHICH MUST BE REMOVED BY A TRACTOR \*

EXPLANATION: MG/L = MILLIGRAMS PER LITER; UG/L = MICROGRAMS PER LITER; MEQ/L = MILLIEQUIVALENTS PER LITER; FT = FEET; MT = METERS; (M) = MEASURED; (E) = ESTIMATED; (R) = REPORTED; TR = TOTAL RECOVERABLE; TOT = TOTAL; BIO = BIOLOGICALLY AVAILABLE.

OTHER AVAILABLE DATA QW NA S2 WI QW PW AT OTHER  
OTHER FILE NUMBERS:

PROJECT: COST:  
LAST EDIT DATE: 09-MAR-84 BY: TP \*BCS  
PROCESSING PROGRAM: F173OP V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
18.1 59.6 22.2 0.2 10.5 17.4 72.0 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 81Q0152



MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 81Q1554

STATE MONTANA COUNTY TETON  
LATITUDE-LONGITUDE 47D37'55"N 111D50'12"W SITE LOCATION 22N 2W 26 CBBB  
UTM COORDINATES 7 N E MBMG SITE  
TOPOGRAPHIC MAP FAIRFIELD 15' STATION ID 473755111501201  
GEOLOGIC SOURCE 110TRRC\* \* SAMPLE SOURCE WELL  
DRAINAGE BASIN BD LAND SURFACE ALTITUDE  
AGENCY + SAMPLER MBMG\* RAN SUSTAINED YIELD  
BOTTLE NUMBER FR#2-3S YIELD MEAS METHOD  
DATE SAMPLED 03-SEP-81 TOTAL DEPTH OF WELL 19.8 FT (M)  
TIME SAMPLED 12:00 HOURS SWL ABOVE(-) OR BELOW GS 6.01 FT (M)  
LAB + ANALYST MBMG\* FNA CASING DIAMETER 6 IN (M)  
DATE ANALYZED 13-OCT-81 CASING TYPE STEEL  
SAMPLE HANDLING 4230 COMPLETION TYPE 01\*  
METHOD SAMPLED PUMPED PERFORATION INTERVAL  
WATER USE DOMESTIC

SAMPLING SITE OSTBERG, RON: APPROX 7 MI ENE OF FAIRFIELD  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L | MEQ/L |                      | MG/L | MEQ/L |
|----------------|------|-------|----------------------|------|-------|
| CALCIUM (CA)   | 39.7 | 1.98  | BICARBONATE (HCO3)   | 439. | 7.19  |
| MAGNESIUM (MG) | 76.  | 6.25  | CARBONATE (CO3)      | 0.   |       |
| SODIUM (NA)    | 39.4 | 1.71  | CHLORIDE (CL)        | 17.6 | 0.50  |
| POTASSIUM (K)  | 1.1  | 0.03  | SULFATE (SO4)        | 67.3 | 1.40  |
| IRON (FE)      | .003 | 0.00  | NITRATE (AS N)       | 12.2 | 0.87  |
| MANGANESE (MN) | .001 | 0.00  | FLUORIDE (F)         | .85  | 0.04  |
| SILICA (SIO2)  | 12.0 |       | PHOSPHATE TOT (AS P) |      |       |

TOTAL CATIONS 9.98 TOTAL ANIONS 10.01

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) 0.13

|                             |        |                           |        |
|-----------------------------|--------|---------------------------|--------|
| CALCULATED DISSOLVED SOLIDS | 482.41 | TOTAL HARDNESS AS CaCO3   | 411.95 |
| SUM OF DISS. CONSTITUENT    | 705.15 | TOTAL ALKALINITY AS CaCO3 | 360.06 |
| FIELD CONDUCTVY, MICROMHOS  | 894.   | FIELD ALKALINITY AS CaCO3 | 344.0  |
| LAB CONDUCTVY, MICROMHOS    | 820.2  | RYZNAR STABILITY INDEX    | 6.71   |
| FIELD PH                    | 7.18   | LANGLIER SATURATION INDEX | 0.64   |
| LABORATORY PH               | 7.98   | SODIUM ADSORPTION RATIO   | 0.84   |

| PARAMETER                  | VALUE  | PARAMETER                   | VALUE |
|----------------------------|--------|-----------------------------|-------|
| FIELD TEMP. WATER          | 11.5 C |                             |       |
| LITHIUM, DISS (MG/L AS LI) | .051   | DISSOLVD SOLIDS (CALC MG/L) | 482.  |

REMARKS: COOPERATIVE OWNER \*

EXPLANATION: MG/L = MILLIGRAMS PER LITER, UG/L = MICROGRAMS PER LITER, MEQ/L = MILLIEQUIVALENTS PER LITER, FT = FEET, MT = METERS, (M) = MEASURED, (E) = ESTIMATED, (R) = REPORTED, TR = TOTAL RECOVERABLE, TOT = TOTAL, BIO = BIOLOGICALLY AVAILABLE.

OTHER AVAILABLE DATA QW WA S2 WJ OW PW AT OTHER  
OTHER FILE NUMBERS:

PROJECT: COST:  
LAST EDIT DATE: 04-FEB-83 BY: TP \*BCS  
PROCESSING PROGRAM: F1730P V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
19.9 62.7 17.2 0.3 5.5 15.4 79.1 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 81Q1554

MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 82Q0243

STATE MONTANA COUNTY TETON  
LATITUDE-LONGITUDE 47D37'55"N 111W50'12"W SITE LOCATION 22N 02W 26\*CRBB  
UTM COORDINATES Z N NBMG SITE  
TOPOGRAPHIC MAP FAIRFIELD 15' STATION ID 473755111501201  
GEOLOGIC SOURCE 110TRRC\* \* SAMPLE SOURCE WELL  
DRAINAGE BASIN BD LAND SURFACE ALTITUDE 3924.0 FT < 1.  
AGENCY + SAMPLER MBMG\*RAM SUSTAINED YIELD  
BOTTLE NUMBER FAIR 3U YIELD MEAS METHOD  
DATE SAMPLED 12-MAY-82 TOTAL DEPTH OF WELL 19.8 FT (M)  
TIME SAMPLED 11:30 HOURS SWL ABOVE(-) OR BELOW GS 8.71 FT (M)  
LAB + ANALYST MBMG\*FNA CASING DIAMETER 6 IN (M)  
DATE ANALYZED 10-JUN-82 CASING TYPE STEEL  
SAMPLE HANDLING 4280 COMPLETION TYPE 01\*01  
METHOD SAMPLED PUMPED PERFORATION INTERVAL  
WATER USE DOMESTIC

SAMPLING SITE OSTBERG RON\*APPROX. 7 MI ENE OF FAIRFIELD  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L  | MEQ/L |                      | MG/L | MEQ/L |
|----------------|-------|-------|----------------------|------|-------|
| CALCIUM (CA)   | 33.4  | 1.67  | BICARBONATE (HCO3)   | 410. | 6.72  |
| MAGNESIUM (MG) | 65.9  | 5.42  | CARBONATE (CO3)      | .0   |       |
| SODIUM (NA)    | 45.9  | 2.00  | CHLORIDE (CL)        | 12.9 | 0.36  |
| POTASSIUM (K)  | 1.1   | 0.03  | SULFATE (SO4)        | 75.4 | 1.57  |
| IRON (FE)      | .022  | 0.00  | NITRATE (AS N)       | 6.10 | 0.44  |
| MANGANESE (MN) | <.001 |       | FLUORIDE (F)         | .94  | 0.05  |
| SILICA (SI02)  | 9.9   |       | PHOSPHATE TOT (AS P) |      |       |

TOTAL CATIONS 9.11 TOTAL ANIONS 9.14

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) 0.10

|                             |        |                           |        |
|-----------------------------|--------|---------------------------|--------|
| CALCULATED DISSOLVED SOLIDS | 453.53 | TOTAL HARDNESS AS CaCO3   | 354.64 |
| SUM OF DISS. CONSTITUENT    | 661.56 | TOTAL ALKALINITY AS CaCO3 | 336.27 |
| FIELD CONDUCTVY, MICROMHOS  | 856.   | FIELD ALKALINITY AS CaCO3 | 340.0  |
| LAB CONDUCTVY, MICROMHOS    | 739.1  | RYZNAR STABILITY INDEX    | 7.29   |
| FIELD PH                    | 7.75   | LANGLIER SATURATION INDEX | 0.16   |
| LABORATORY PH               | 7.61   | SODIUM ADSORPTION RATIO   | 1.06   |

| PARAMETER                 | VALUE  | PARAMETER         | VALUE |
|---------------------------|--------|-------------------|-------|
| FIELD TEMP. AIR           | 16.5 C | FIELD TEMP. WATER | 6.4 C |
| DISSOLVD SOLIDS(CALC MG/L | 454.   |                   |       |

REMARKS: WELL IS COVERED BY A 4 FT SO CONCRETE PAD WHICH MUST BE REMOVED BY A TRACTOR. (COOPERATIVE OWNER)

EXPLANATION: MG/L = MILLIGRAMS PER LITER; UG/L = MICROGRAMS PER LITER; MEQ/L = MILLIEQUIVALENTS PER LITER. FT = FEET, MT = METERS, (M) = MEASURED, (E) = ESTIMATED, (R) = REPORTED, TR = TOTAL RECOVERABLE, TOT = TOTAL, BIO = BIOLOGICALLY AVAILABLE.

OTHER AVAILABLE DATA QW WA S2 WI OW PW AT OTHER  
OTHER FILE NUMBERS: Y

PROJECT: COST:  
LAST EDIT DATE: 23-SEP-83 BY: TP \*JKS  
PROCESSING PROGRAM: F1730P V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
18.3 59.5 21.9 0.3 4.2 18.1 77.7 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 82Q0243



MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 81Q0153

STATE MONTANA COUNTY TETON  
LATITUDE-LONGITUDE 47D36'40"N 111D55'15"W SITE LOCATION 22N 2W 31 CCCC  
UTM COORDINATES Z N E MRMG SITE  
TOPOGRAPHIC MAP FAIRFIELD 15' STATION ID 473640111551501  
GEOLOGIC SOURCE 110TRRC\* \* SAMPLE SOURCE WELL  
DRAINAGE BASIN BD LAND SURFACE ALTITUDE 4006. FT < 1.  
AGENCY + SAMPLER MRMG\*AN SUSTAINED YIELD  
BOTTLE NUMBER FAIR 4 YIELD MEAS METHOD  
DATE SAMPLED 01-APR-81 TOTAL DEPTH OF WELL 14.2 FT (M)  
TIME SAMPLED 18:20 HOURS SWL ABOVE(-) OR BELOW GS 10.47 FT (M)  
LAB + ANALYST MRMG\*FNA CASING DIAMETER 18 IN (M)  
DATE ANALYZED 27-APR-81 CASING TYPE CULVERT  
SAMPLE HANDLING 5330 COMPLETION TYPE 01\*  
METHOD SAMPLED PUMPED PERFORATION INTERVAL  
WATER USE STOCK

SAMPLING SITE FREMAN \* 2.5 MI EAST OF FAIRFIELD \*  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L  | MEQ/L |                      | MG/L  | MEQ/L |
|----------------|-------|-------|----------------------|-------|-------|
| CALCIUM (CA)   | 53.8  | 2.38  | BICARBONATE (HCO3)   | 278.2 | 4.56  |
| MAGNESIUM (MG) | 26.6  | 2.19  | CARBONATE (CO3)      | 0.    |       |
| SODIUM (NA)    | 3.4   | 0.15  | CHLORIDE (CL)        | 1.2   | 0.03  |
| POTASSIUM (K)  | 1.0   | 0.03  | SULFATE (SO4)        | 29.1  | 0.61  |
| IRON (FE)      | <.002 |       | NITRATE (AS N)       | .51   | 0.04  |
| MANGANESE (MN) | <.001 |       | FLUORIDE (F)         | .26   | 0.01  |
| SILICA (SIO2)  | 9.9   |       | PHOSPHATE TOT (AS P) |       |       |

TOTAL CATIONS 5.05 TOTAL ANIONS 5.25

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) 1.12

|                             |        |                           |        |
|-----------------------------|--------|---------------------------|--------|
| CALCULATED DISSOLVED SOLIDS | 262.81 | TOTAL HARDNESS AS CaCO3   | 243.82 |
| SUM OF DISS. CONSTITUENT    | 403.97 | TOTAL ALKALINITY AS CaCO3 | 228.17 |
| FIELD CONDUCTVY, MICROMHOS  |        | FIELD ALKALINITY AS CaCO3 | 232.   |
| LAB CONDUCTVY, MICROMHOS    | 463.8  | RYZNAR STABILITY INDEX    | 7.04   |
| FIELD PH                    | 7.57   | LANGLIER SATURATION INDEX | 0.37   |
| LABORATORY PH               | 7.78   | SODIUM ADSORPTION RATIO   | 0.09   |

| PARAMETER                  | VALUE | PARAMETER                    | VALUE |
|----------------------------|-------|------------------------------|-------|
| ALUMINUM, DISS (MG/L-AL)   | <.03  | NICKEL, DISS (MG/L AS NI)    | <.01  |
| SILVER, DISS (MG/L AS AG)  | <.002 | LEAD, DISS (MG/L AS PB)      | <.02  |
| BORON, DISS (MG/L AS B)    | <.02  | STRONTIUM, DISS (MG/L-SR)    | .48   |
| CADMIUM, DISS (MG/L AS CD) | <.002 | TITANIUM, DISS (MG/L AS TI)  | <.001 |
| COPPER, DISS (MG/L AS CU)  | <.002 | VANADIUM, DISS (MG/L AS V)   | <.001 |
| LITHIUM, DISS (MG/L AS LI) | .003  | ZINC, DISS (MG/L AS ZN)      | .029  |
| MOLYBDENUM, DISS (MG/L-MO) | <.02  | ZIRCONIUM, DISS (MG/L AS ZR) | <.004 |
| CHROMIUM, DISS (MG/L-CR)   | <.002 | PHOSPHORUS, TOTAL (MG/L-P)   | <.003 |
| O-PHOSPHATE, DISS (MG/L-P) | <.003 | CARBON, TOT, ORG. (MG/L-C)   | 1.5   |
| SELENIUM, DISS (UG/L-SE)   | .2    | NITROGEN, KJEL, TO (MG/L-N)  | .3    |

REMARKS: WELL LOCATED NEXT TO CORRAL \*  
LAB: FU CA 54.5, MG 27.6 NA 3.5 MG/L GIVE .4 SIGMA & 5.16 CATION MEQVS \*

EXPLANATION: MG/L = MILLIGRAMS PER LITER, UG/L = MICROGRAMS PER LITER, MEQ/L = MILLIEQUIVALENTS PER LITER. FT = FEET, MT = METERS. (M) = MEASURED, (E) = ESTIMATED, (R) = REPORTED. TR = TOTAL RECOVERABLE. TOT = TOTAL. BIO = BIOLOGICALLY AVAILABLE.

OTHER AVAILABLE DATA QW WA S2 WI OW PW AT OTHER  
OTHER FILE NUMBERS: Y

PROJECT: COST:  
LAST EDIT DATE: 09-MAR-84 BY: TP \*BCS  
PROCESSING PROGRAM: F1730P V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
53.2 43.4 2.9 0.5 0.7 11.7 87.7 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 81Q0153

MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 81Q1555

STATE MONTANA COUNTY TETON  
LATITUDE-LONGITUDE 47D36'42"N 111D55'15"W SITE LOCATION 22N 2W 31 CCCC  
UTM COORDINATES Z N E MBMG SITE  
TOPOGRAPHIC MAP FAIRFIELD 15' STATION ID 473642111551501  
GEOLOGIC SOURCE 110TRRC\* \* SAMPLE SOURCE WELL  
DRAINAGE BASIN BD LAND SURFACE ALTITUDE 4006.0 FT < 10  
AGENCY + SAMPLER MBMG\*AN SUSTAINED YIELD  
BOTTLE NUMBER FR#2-4S YIELD MEAS METHOD  
DATE SAMPLED 02-SEP-81 TOTAL DEPTH OF WELL 14.2 FT (M)  
TIME SAMPLED 13:45 HOURS SWL ABOVE(-) OR BELOW GS 6.21 FT (M)  
LAB + ANALYST MBMG\*FNA CASING DIAMETER 18 IN (M)  
DATE ANALYZED 13-OCT-81 CASING TYPE CULVERT  
SAMPLE HANDLING 4230 COMPLETION TYPE 01\*  
METHOD SAMPLED PUMPED PERFORATION INTERVAL  
WATER USE STOCK

SAMPLING SITE FREEMAN: 2.5 MI EAST OF FAIRFIELD \*  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L  | MEQ/L |                      | MG/L  | MEQ/L |
|----------------|-------|-------|----------------------|-------|-------|
| CALCIUM (CA)   | 62.1  | 3.10  | BICARBONATE (HCO3)   | 290.8 | 4.77  |
| MAGNESIUM (MG) | 26.4  | 2.17  | CARBONATE (CO3)      | 0.    |       |
| SODIUM (NA)    | 3.6   | 0.16  | CHLORIDE (CL)        | 1.6   | 0.05  |
| POTASSIUM (K)  | 2.1   | 0.05  | SULFATE (SO4)        | 20.9  | 0.44  |
| IRON (FE)      | .042  | 0.00  | NITRATE (AS N)       | 1.04  | 0.07  |
| MANGANESE (MN) | <.001 |       | FLUORIDE (F)         | .35   | 0.02  |
| SILICA (SIO2)  | 13.2  |       | PHOSPHATE TOT (AS P) |       |       |

TOTAL CATIONS 5.48 TOTAL ANIONS 5.34

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) -0.78

|                             |        |                           |        |
|-----------------------------|--------|---------------------------|--------|
| CALCULATED DISSOLVED SOLIDS | 274.58 | TOTAL HARDNESS AS CaCO3   | 263.73 |
| SUM OF DISS. CONSTITUENT    | 422.13 | TOTAL ALKALINITY AS CaCO3 | 238.51 |
| FIELD CONDUCTVY, MICROMHOS  | 448.   | FIELD ALKALINITY AS CaCO3 | 250.   |
| LAB CONDUCTVY, MICROMHOS    | 464.3  | RYZNAR STABILITY INDEX    | 6.72   |
| FIELD PH                    | 8.05   | LANGLIER SATURATION INDEX | 0.61   |
| LABORATORY PH               | 7.94   | SODIUM ADSORPTION RATIO   | 0.10   |

| PARAMETER                  | VALUE  | PARAMETER                   | VALUE |
|----------------------------|--------|-----------------------------|-------|
| FIELD TEMP. WATER          | 14.0 C |                             |       |
| LITHIUM, DISS (MG/L AS LI) | .013   | DISSOLVD SOLIDS (CALC MG/L) | 275.  |

REMARKS: WELL LOCATED NEXT TO CORRAL \*

EXPLANATION: MG/L = MILLIGRAMS PER LITER, UG/L = MICROGRAMS PER LITER, MEQ/L = MILLIEQUIVALENTS PER LITER, FT = FEET, MT = METERS. (M) = MEASURED, (E) = ESTIMATED, (R) = REPORTED, TR = TOTAL RECOVERABLE, TOT = TOTAL. BIO = BIOLOGICALLY AVAILABLE.

QW WA S2 WI OW PW AT OTHER

OTHER AVAILABLE DATA  
OTHER FILE NUMBERS:

PROJECT: COST:  
LAST EDIT DATE: 04-FEB-83 BY: TP \*BCS  
PROCESSING PROGRAM: F1730P V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
56.5 39.6 2.9 1.0 0.9 8.3 90.8 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 81Q1555



MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 82Q0244

STATE MONTANA COUNTY TETON  
LATITUDE-LONGITUDE 47D36'42"N 111D55'15"W SITE LOCATION 22N 02W 31\*CCCC  
UTM COORDINATES Z N E MBMG SITE  
TOPOGRAPHIC MAP FAIRFIELD 15' STATION ID 473642111551501  
GEOLOGIC SOURCE 110TRRC\* \* SAMPLE SOURCE WELL  
DRAINAGE BASIN BD LAND SURFACE ALTITUDE 4006.0 FT < 10  
AGENCY + SAMPLER MBMG\*AN SUSTAINED YIELD  
BOTTLE NUMBER FAIR 4U YIELD MEAS METHOD  
DATE SAMPLED 12-MAY-82 TOTAL DEPTH OF WELL 14.2 FT (M)  
TIME SAMPLED 14:00 HOURS SWL ABOVE(-) OR BELOW GS 13.87 FT (M)  
LAB + ANALYST MBMG\*FNA CASING DIAMETER 18 IN (M)  
DATE ANALYZED 10-JUN-82 COMPLETION TYPE CULVERT  
SAMPLE HANDLING 4230 PERFORATION INTERVAL 01\*01  
METHOD SAMPLED PUMPED  
WATER USE STOCK

SAMPLING SITE FREEMAN\*2.5 MILES EAST OF FAIRFIELD  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L  | MEQ/L |                      | MG/L  | MEQ/L |
|----------------|-------|-------|----------------------|-------|-------|
| CALCIUM (CA)   | 49.4  | 2.47  | BICARBONATE (HCO3)   | 272.3 | 4.46  |
| MAGNESIUM (MG) | 28.2  | 2.32  | CARBONATE (CO3)      | .0    |       |
| SODIUM (NA)    | 3.9   | 0.17  | CHLORIDE (CL)        | 2.0   | 0.06  |
| POTASSIUM (K)  | 1.0   | 0.03  | SULFATE (SO4)        | 15.2  | 0.32  |
| IRON (FE)      | .010  | 0.00  | NITRATE (AS N)       | .59   | 0.04  |
| MANGANESE (MN) | <.001 |       | FLUORIDE (F)         | .34   | 0.02  |
| SILICA (SIO2)  | 9.1   |       | PHOSPHATE TOT (AS P) |       |       |

TOTAL CATIONS 4.98 TOTAL ANIONS 4.90

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) -0.48

|                             |        |                           |        |
|-----------------------------|--------|---------------------------|--------|
| CALCULATED DISSOLVED SOLIDS | 243.88 | TOTAL HARDNESS AS CaCO3   | 239.42 |
| SUM OF DISS. CONSTITUENT    | 382.04 | TOTAL ALKALINITY AS CaCO3 | 223.33 |
| FIELD CONDUCTVY, MICROMHOS  | 471.   | FIELD ALKALINITY AS CaCO3 | 222.0  |
| LAB CONDUCTVY, MICROMHOS    | 430.8  | RYZNAR STABILITY INDEX    | 7.24   |
| FIELD PH                    | 7.85   | LANGLIER SATURATION INDEX | 0.21   |
| LABORATORY PH               | 7.67   | SODIUM ADSORPTION RATIO   | 0.11   |

|                           |        |                   |       |
|---------------------------|--------|-------------------|-------|
| PARAMETER                 | VALUE  | PARAMETER         | VALUE |
| FIELD TEMP. AIR           | 17.0 C | FIELD TEMP. WATER | 6.7 C |
| DISSOLVD SOLIDS(CALC MG/L | 244.   |                   |       |

REMARKS: WELL LOCATED NEXT TO CORRAL

EXPLANATION: MG/L = MILLIGRAMS PER LITER, UG/L = MICROGRAMS PER LITER, MEQ/L = MILLIEQUIVALENTS PER LITER, FT = FEET, MT = METERS, (M) = MEASURED, (E) = ESTIMATED, (R) = REPORTED, TR = TOTAL RECOVERABLE, TOT = TOTAL, BIO = BIOLOGICALLY AVAILABLE.

OTHER AVAILABLE DATA QW WA S2 WI OW PW AT OTHER  
Y  
OTHER FILE NUMBERS:

PROJECT: COST:  
LAST EDIT DATE: 23-SEP-83 BY: TP \*JKS  
PROCESSING PROGRAM: F1730P V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
49.5 46.6 3.4 0.5 1.2 6.5 92.3 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 82Q0244

MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 81Q0156

STATE MONTANA COUNTY TETON  
LATITUDE-LONGITUDE 47D39'20"N 111D57'19"W SITE LOCATION 22N 3W 14 CDDD  
UTM COORDINATES Z N E MBMG SITE  
TOPOGRAPHIC MAP FAIRFIELD 15' STATION ID 473920111571901  
GEOLOGIC SOURCE 110TRRC\* \* LAND SURFACE ALTITUDE 3949. FT < 1.  
DRAINAGE BASIN BD SUSTAINED YIELD  
AGENCY + SAMPLER MBMG\*FNA YIELD MEAS METHOD  
BOTTLE NUMBER FAIR 7 TOTAL DEPTH OF WELL 59.0 FT (M)  
DATE SAMPLED 02-APR-81 SWL ABOVE(-) OR BELOW GS 36.94 FT (M)  
TIME SAMPLED 11:54 HOURS CASING DIAMETER 6 IN (M)  
LAB + ANALYST MBMG\*FNA CASING TYPE STEEL  
DATE ANALYZED 27-APR-81 COMPLETION TYPE 01\*  
SAMPLE HANDLING 5330 PERFORATION INTERVAL  
METHOD SAMPLED PUMPED  
WATER USE DOMESTIC

SAMPLING SITE KONEN, MICHAEL \* 3 MI NORTH OF FAIRFIELD \*  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L  | MEQ/L |                      | MG/L | MEQ/L |
|----------------|-------|-------|----------------------|------|-------|
| CALCIUM (CA)   | 24.2  | 1.21  | BICARBONATE (HCO3)   | 344. | 5.64  |
| MAGNESIUM (MG) | 56.7  | 4.66  | CARBONATE (CO3)      | 0.   |       |
| SODIUM (NA)    | 6.7   | 0.29  | CHLORIDE (CL)        | 2.0  | 0.06  |
| POTASSIUM (K)  | .6    | 0.02  | SULFATE (SO4)        | 22.7 | 0.47  |
| IRON (FE)      | .009  | 0.00  | NITRATE (AS N)       | 2.58 | 0.18  |
| MANGANESE (MN) | <.001 |       | FLUORIDE (F)         | .66  | 0.03  |
| SILICA (SiO2)  | 10.7  |       | PHOSPHATE TOT (AS P) |      |       |

TOTAL CATIONS 6.18 TOTAL ANIONS 6.39

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) 1.04

|                             | VALUE  |                           | VALUE  |
|-----------------------------|--------|---------------------------|--------|
| CALCULATED DISSOLVED SOLIDS | 296.31 | TOTAL HARDNESS AS CaCO3   | 293.80 |
| SUM OF DISS. CONSTITUENT    | 470.85 | TOTAL ALKALINITY AS CaCO3 | 282.14 |
| FIELD CNDUCTVY, MICROMHOS   |        | FIELD ALKALINITY AS CaCO3 | 242.   |
| LAB CNDUCTVY, MICROMHOS     | 565.3  | RYZNAR STABILITY INDEX    | 7.42   |
| FIELD PH                    | 7.41   | LANGLIER SATURATION INDEX | 0.24   |
| LABORATORY PH               | 7.91   | SODIUM ADSORPTION RATIO   | 0.17   |

| PARAMETER                   | VALUE | PARAMETER                  | VALUE |
|-----------------------------|-------|----------------------------|-------|
| FIELD TEMP. WATER           | 6.0 C |                            |       |
| ALUMINUM, DISS (MG/L-AL)    | <.03  | NICKEL, DISS (MG/L AS NI)  | <.01  |
| SILVER, DISS (MG/L AS AG)   | <.002 | LEAD, DISS (MG/L AS PB)    | <.04  |
| BORON, DISS (MG/L AS B)     | <.02  | STRONTIUM, DISS (MG/L-SR)  | .69   |
| CADMIUM, DISS (MG/L AS CD)  | <.002 | TITANIUM DIS (MG/L AS TI)  | <.001 |
| COPPER, DISS (MG/L AS CU)   | <.002 | VANADIUM, DISS (MG/L AS V) | <.001 |
| LITHIUM, DISS (MG/L AS LI)  | .027  | ZINC, DISS (MG/L AS ZN)    | .019  |
| MOLYBDENUM, DISS (MG/L-MO)  | <.02  | ZIRCONIUM DIS (MG/L AS ZR) | <.004 |
| CHROMIUM, DISS (MG/L-CR)    | <.002 | PHOSPHORUS, TOTAL (MG/L-P) | <.003 |
| O-PHOSPHATE, DISS (MG/L-P)  | <.003 | SELENIUM, DISS (UG/L-SE)   | .7    |
| NITROGEN, KJEL, TO (MG/L-N) | <.1   |                            |       |

REMARKS: OWNER: MICHAEL KONEN \*  
LAB: FU MG 58.0 MG/L GIVES .5 SIGMA AND 6.285 CATION MEQVS \*

EXPLANATION: MG/L = MILLIGRAMS PER LITER, UG/L = MICROGRAMS PER LITER, MEQ/L = MILLIEQUIVALENTS PER LITER, FT = FEET, MI = METERS, (M) = MEASURED, (E) = ESTIMATED, (R) = REPORTED, TR = TOTAL RECOVERABLE, TOT = TOTAL, BIO = BIOLOGICALLY AVAILABLE.

OTHER AVAILABLE DATA QW WA S2 WI OW PW AT OTHER  
OTHER FILE NUMBERS:

PROJECT: COST:  
LAST EDIT DATE: 09-MAR-84 BY: TP \*BCS  
PROCESSING PROGRAM: F1730P V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
19.5 75.5 4.7 0.2 0.9 7.7 91.4 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 81Q0156



MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 81Q1558

STATE MONTANA COUNTY TETON  
LATITUDE-LONGITUDE 47D39'20"N 111D57'19"W SITE LOCATION 22N 3W 14 CDDD 01  
UTM COORDINATES Z N E MBMG SITE  
TOPOGRAPHIC MAP FAIRFIELD 15' STATION ID 473920111571901  
GEOLOGIC SOURCE 110TRRC\* \* SAMPLE SOURCE WELL  
DRAINAGE BASIN BD LAND SURFACE ALTITUDE 3949.0 FT < 10  
AGENCY + SAMPLER MBMG\*AN SUSTAINED YIELD  
BOTTLE NUMBER FR#2-7S YIELD MEAS METHOD  
DATE SAMPLED 02-SEP-81 TOTAL DEPTH OF WELL 59.0 FT (M)  
TIME SAMPLED 16:15 HOURS SWL ABOVE(-) OR BELOW GS 16.88 FT (M)  
LAB + ANALYST MBMG\*FNA CASING DIAMETER 6 IN (M)  
DATE ANALYZED 13-OCT-81 CASING TYPE STEEL  
SAMPLE HANDLING 4230 COMPLETION TYPE 01\*  
METHOD SAMPLED PUMPED PERFORATION INTERVAL \* TO  
WATER USE DOMESTIC

SAMPLING SITE KONEN, MICHAEL \* 3 MI NORTH OF FAIRFIELD \*  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L  | MEQ/L |                      | MG/L | MEQ/L |
|----------------|-------|-------|----------------------|------|-------|
| CALCIUM (CA)   | 24.5  | 1.22  | BICARBONATE (HCO3)   | 323. | 5.29  |
| MAGNESIUM (MG) | 55.6  | 4.57  | CARBONATE (CO3)      | 0.   |       |
| SODIUM (NA)    | 6.5   | 0.28  | CHLORIDE (CL)        | 3.3  | 0.09  |
| POTASSIUM (K)  | .8    | 0.02  | SULFATE (SO4)        | 21.2 | 0.44  |
| IRON (FE)      | <.002 |       | NITRATE (AS N)       | 3.61 | 0.26  |
| MANGANESE (MN) | <.001 |       | FLUORIDE (F)         | .67  | 0.04  |
| SILICA (SIO2)  | 10.3  |       | PHOSPHATE TOT (AS P) |      |       |

TOTAL CATIONS 6.10 TOTAL ANIONS 6.12

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) 0.11

|                             |        |                           |        |
|-----------------------------|--------|---------------------------|--------|
| CALCULATED DISSOLVED SOLIDS | 285.59 | TOTAL HARDNESS AS CaCO3   | 290.03 |
| SUM OF DISS. CONSTITUENT    | 449.48 | TOTAL ALKALINITY AS CaCO3 | 264.92 |
| FIELD CONDUCTVY, MICROMHOS  | 519.   | FIELD ALKALINITY AS CaCO3 | 260.0  |
| LAB CONDUCTVY, MICROMHOS    | 503.   | RYZNAR STABILITY INDEX    | 7.19   |
| FIELD PH                    | 7.82   | LANGLIER SATURATION INDEX | 0.50   |
| LABORATORY PH               | 8.19   | SODIUM ADSORPTION RATIO   | 0.17   |

| PARAMETER                  | VALUE  | PARAMETER                   | VALUE |
|----------------------------|--------|-----------------------------|-------|
| FIELD TEMP. WATER          | 12.0 C |                             |       |
| LITHIUM, DISS (MG/L AS LI) | .031   | DISSOLVD SOLIDS (CALC MG/L) | 286.  |

REMARKS: HOUSE IS RENTED OUT BY KONEN \*

EXPLANATION: MG/L = MILLIGRAMS PER LITER; UG/L = MICROGRAMS PER LITER; MEQ/L = MILLIEQUIVALENTS PER LITER; FT = FEET; MT = METERS; (M) = MEASURED; (E) = ESTIMATED; (R) = REPORTED; TR = TOTAL RECOVERABLE; TOT = TOTAL; BIO = BIOLOGICALLY AVAILABLE.

OTHER AVAILABLE DATA QW WA S2 WI OW FW AT OTHER  
OTHER FILE NUMBERS:

PROJECT: COST:  
LAST EDIT DATE: 04-FEB-83 BY: TP \*BCS  
PROCESSING PROGRAM: F1730P V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
20.0 75.0 4.6 0.3 1.6 7.6 90.8 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 81Q1558

MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 82Q0247

STATE MONTANA COUNTY TETON  
LATITUDE-LONGITUDE 47D39'20"N 111D57'19"W SITE LOCATION 22N 3W 14\*CDDD 01  
UTM COORDINATES Z N MBMG SITE  
TOPOGRAPHIC MAP FAIRFIELD 15' E STATION ID 473920111571901  
GEOLOGIC SOURCE 110TRRC\* \* SAMPLE SOURCE WELL  
DRAINAGE BASIN BD LAND SURFACE ALTITUDE 3949.0 FT < 10  
AGENCY + SAMPLER MBMG\*RAH SUSTAINED YIELD  
BOTTLE NUMBER FAIR 7U YIELD MEAS METHOD  
DATE SAMPLED 11-MAY-82 TOTAL DEPTH OF WELL 59.0 FT (M)  
TIME SAMPLED 15:00 HOURS SWL ABOVE(-) OR BELOW GS 38.62 FT (M)  
LAB + ANALYST MBMG\*FNA CASING DIAMETER 6 IN (M)  
DATE ANALYZED 10-JUN-82 CASING TYPE STEEL  
SAMPLE HANDLING 4230 COMPLETION TYPE 01\*  
METHOD SAMPLED PUMPED PERFORATION INTERVAL  
WATER USE DOMESTIC

SAMPLING SITE KONEN MICHAEL\*3 MI NORTH OF FAIRFIELD  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L | MEQ/L |                      | MG/L | MEQ/L |
|----------------|------|-------|----------------------|------|-------|
| CALCIUM (CA)   | 25.6 | 1.28  | BICARBONATE (HCO3)   | 345. | 5.65  |
| MAGNESIUM (MG) | 59.1 | 4.86  | CARBONATE (CO3)      | .0   |       |
| SODIUM (NA)    | 6.8  | 0.30  | CHLORIDE (CL)        | 1.0  | 0.03  |
| POTASSIUM (K)  | 1.0  | 0.03  | SULFATE (SO4)        | 17.3 | 0.36  |
| IRON (FE)      | .020 | 0.00  | NITRATE (AS N)       | 3.84 | 0.27  |
| MANGANESE (MN) | .001 | 0.00  | FLUORIDE (F)         | .70  | 0.04  |
| SILICA (SIO2)  | 10.3 |       | PHOSPHATE TOT (AS P) |      |       |

TOTAL CATIONS 6.46 TOTAL ANIONS 6.35

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) -0.54

|                             |        |                           |        |
|-----------------------------|--------|---------------------------|--------|
| CALCULATED DISSOLVED SOLIDS | 295.61 | TOTAL HARDNESS AS CAC03   | 307.18 |
| SUM OF DISS. CONSTITUENT    | 470.66 | TOTAL ALKALINITY AS CAC03 | 282.96 |
| FIELD CONDUCTVY, MICROMHOS  | 588.   | FIELD ALKALINITY AS CAC03 | 286.0  |
| LAB CONDUCTVY, MICROMHOS    | 548.0  | RYZNAR STABILITY INDEX    | 7.41   |
| FIELD PH                    | 7.85   | LANGLIER SATURATION INDEX | 0.23   |
| LABORATORY PH               | 7.87   | SODIUM ADSORPTION RATIO   | 0.17   |

| PARAMETER                  | VALUE  | PARAMETER                   | VALUE  |
|----------------------------|--------|-----------------------------|--------|
| FIELD TEMP. AIR            | 18.0 C | FIELD TEMP. WATER           | 10.3 C |
| LITHIUM, DISS (MG/L AS LI) | .028   | DISSOLVD SOLIDS (CALC MG/L) | 296.   |

REMARKS: HOUSE IS RENTED OUT BY KONEN'S

EXPLANATION: MG/L = MILLIGRAMS PER LITER, UG/L = MICROGRAMS PER LITER, MEQ/L =  
MILLIEQUIVALENTS PER LITER, FT = FEET, MT = METERS. (M) = MEASURED, (E) =  
ESTIMATED, (R) = REPORTED, TR = TOTAL RECOVERABLE, TOT = TOTAL.  
BIO = BIOLOGICALLY AVAILABLE.

OTHER AVAILABLE DATA QW WA S2 WI OW PW AT OTHER  
OTHER FILE NUMBERS: Y

PROJECT: COST:  
LAST EDIT DATE: 22-NOV-83 BY: TP \*BCS  
PROCESSING PROGRAM: F1730P V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
19.8 75.3 4.6 0.4 0.5 6.0 93.6 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 82Q0247



MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 82Q0261

STATE MONTANA  
LATITUDE-LONGITUDE 47D34'12"N 111D36'29"W  
UTM COORDINATES Z N E  
TOPOGRAPHIC MAP FAIRFIELD 15'  
GEOLOGIC SOURCE 110TRRC\*  
DRAINAGE BASIN BD  
AGENCY + SAMPLER MBMG\*  
BOTTLE NUMBER FAIRL13  
DATE SAMPLED 14-MAY-82  
TIME SAMPLED 11:00 HOURS  
LAB + ANALYST MBMG\*FNA  
DATE ANALYZED 10-JUN-82  
SAMPLE HANDLING 4230  
METHOD SAMPLED PUMPED  
WATER USE DOMESTIC AND STOCK

COUNTY TETON  
SITE LOCATION 22N 3W 27\*AAAA  
MBMG SITE  
STATION ID 473412111362901  
SAMPLE SOURCE WELL  
LAND SURFACE ALTITUDE 3970. FT < 10  
SUSTAINED YIELD  
YIELD MEAS METHOD  
TOTAL DEPTH OF WELL 64. FT (M)  
SWL ABOVE(-) OR BELOW GS 50.96 FT (M)  
CASING DIAMETER 6 IN (M)  
CASING TYPE STEEL  
COMPLETION TYPE 01\*  
PERFORATION INTERVAL

SAMPLING SITE BRADY, LYLE  
GEOLOGIC SOURCE TERRACE DEPOSITS (QUATERNARY)

|                | MG/L | MEQ/L |                      | MG/L | MEQ/L |
|----------------|------|-------|----------------------|------|-------|
| CALCIUM (CA)   | 34.9 | 1.74  | BICARBONATE (HCO3)   | 376. | 6.16  |
| MAGNESIUM (MG) | 61.4 | 5.05  | CARBONATE (CO3)      | .0   |       |
| SODIUM (NA)    | 9.3  | 0.40  | CHLORIDE (CL)        | 5.0  | 0.14  |
| POTASSIUM (K)  | 1.2  | 0.03  | SULFATE (SO4)        | 24.1 | 0.50  |
| IRON (FE)      | .052 | 0.00  | NITRATE (AS N)       | 4.95 | 0.35  |
| MANGANESE (MN) | .012 | 0.00  | FLUORIDE (F)         | .62  | 0.03  |
| SILICA (SIO2)  | 10.1 |       | PHOSPHATE TOT (AS P) |      |       |

TOTAL CATIONS 7.23 TOTAL ANIONS 7.19

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) -0.19

|                             |        |                           |        |
|-----------------------------|--------|---------------------------|--------|
| CALCULATED DISSOLVED SOLIDS | 336.86 | TOTAL HARDNESS AS CAC03   | 339.87 |
| SUM OF DISS. CONSTITUENT    | 527.63 | TOTAL ALKALINITY AS CAC03 | 308.38 |
| FIELD CNDUCTVY, MICROMHOS   | 538.   | FIELD ALKALINITY AS CAC03 |        |
| LAB CNDUCTVY, MICROMHOS     | 610.6  | RYZNAR STABILITY INDEX    | 7.28   |
| FIELD PH                    | 7.80   | LANGLIER SATURATION INDEX | 0.19   |
| LABORATORY PH               | 7.66   | SODIUM ADSORPTION RATIO   | 0.22   |

| PARAMETER                | VALUE | PARAMETER                 | VALUE |
|--------------------------|-------|---------------------------|-------|
| FIELD TEMP. WATER        | 11. C |                           |       |
| SELENIUM, DISS (UG/L-SE) | 2.2   | DISSOLVD SOLIDS(CALC MG/L | 337.  |

REMARKS: NEW WELL FOR LYLE BRADY - NO LOG YET

EXPLANATION: MG/L = MILLIGRAMS PER LITER, UG/L = MICROGRAMS PER LITER, MEQ/L  
MILLIEQUIVELENTS PER LITER, FT = FEET, MT = METERS, (M) = MEASURED, (E) =  
ESTIMATED, (R) = REPORTED, TR = TOTAL RECOVERABLE, TOT = TOTAL.  
BIO = BIOLOGICALLY AVAILABLE.

OTHER AVAILABLE DATA QW WA S2 WI OW PW AT OTHER  
OTHER FILE NUMBERS:

PROJECT: COST:  
LAST EDIT DATE: 23-SEP-83 BY: TP \*JKS  
PROCESSING PROGRAM: F1730P V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
24.1 69.9 5.6 0.4 2.1 7.4 90.6 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 82Q0261

MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 81Q0957

STATE MONTANA COUNTY CASCADE  
LATITUDE-LONGITUDE 47°35'54"N 111°05'10"W SITE LOCATION 21N 3W 4 DDDA  
UTM COORDINATES Z N E MBMG SITE  
TOPOGRAPHIC MAP FAIRFIELD 15' \* \* \* STATION ID 473545111591001  
GEOLOGIC SOURCE \* \* \* SAMPLE SOURCE DITCH OR CANAL  
DRAINAGE BASIN RD LAND SURFACE ALTITUDE 4055. FT < .10  
AGENCY + SAMPLER MBMG\*RAM WATER FLOW RATE  
BOTTLE NUMBER FAIR16 FLOW MEAS METHOD  
DATE SAMPLED 23-JUN-81 STAFF GAGE  
TIME SAMPLED 16:20 HOURS STREAM STAGE  
LAB + ANALYST MBMG\*FNA DEPTH TO SAMPLE 1.0 FT (E)  
DATE ANALYZED 15-JUL-81 TOTAL DEPTH OF WATER  
SAMPLE HANDLING 5330 STREAM WIDTH  
METHOD SAMPLED GRAB  
WATER USE IRRIGATION  
SAMPLING SITE GREENFIELD CANAL\*APPR 100' SW OF "A" DROP  
DRAINAGE BASIN SUN RIVER

|                | MG/L  | MEQ/L |                      | MG/L  | MEQ/L |
|----------------|-------|-------|----------------------|-------|-------|
| CALCIUM (CA)   | 31.4  | 1.57  | BICARBONATE (HCO3)   | 127.5 | 2.09  |
| MAGNESIUM (MG) | 7.4   | 0.61  | CARBONATE (CO3)      | 0.    |       |
| SODIUM (NA)    | 1.2   | 0.05  | CHLORIDE (CL)        | .7    | 0.02  |
| POTASSIUM (K)  | .4    | 0.01  | SULFATE (SO4)        | 9.9   | 0.21  |
| IRON (FE)      | .007  | 0.00  | NITRATE (AS N)       | .03   | 0.00  |
| MANGANESE (MN) | <.001 |       | FLUORIDE (F)         | .08   | 0.00  |
| SILICA (SiO2)  | 4.7   |       | PHOSPHATE TOT (AS P) |       |       |

TOTAL CATIONS 2.24 TOTAL ANIONS 2.32

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) 0.60

|                             |        |                           |        |
|-----------------------------|--------|---------------------------|--------|
| CALCULATED DISSOLVED SOLIDS | 118.62 | TOTAL HARDNESS AS CaCO3   | 108.86 |
| SUM OF DISS. CONSTITUENT    | 183.32 | TOTAL ALKALINITY AS CaCO3 | 104.57 |
| FIELD CONDUCTVY, MICROMHOS  | 204.   | FIELD ALKALINITY AS CaCO3 | 170.0  |
| LAB CONDUCTVY, MICROMHOS    | 227.9  | RYZMAR STABILITY INDEX    | 7.74   |
| FIELD PH                    | 8.25   | LANGLIER SATURATION INDEX | 0.25   |
| LABORATORY PH               | 8.23   | SODIUM ADSORPTION RATIO   | 0.05   |

| PARAMETER                   | VALUE  | PARAMETER                    | VALUE |
|-----------------------------|--------|------------------------------|-------|
| FIELD TEMP, WATER           | 13.0 C |                              |       |
| PHOSPHORUS, TOTAL (MG/L-P)  | .034   | CHROMIUM, DISS (MG/L-CR)     | <.002 |
| O-PHOSPHATE, DISS (MG/L-P)  | .018   | COPPER, DISS (MG/L AS CU)    | <.002 |
| LITHIUM, DISS (MG/L AS LI)  | .007   | MOLYBDENUM, DISS (MG/L-MO)   | <.1   |
| SELENIUM, DISS (UG/L-SE)    | .1     | NICKEL, DISS (MG/L AS NI)    | <.01  |
| NITROGEN, KJEL, TO (MG/L-N) | .2     | LEAD, DISS (MG/L AS PB)      | <.04  |
| CARBON, TOT, ORG, (MG/L-C)  | 1.     | STRONTIUM, DISS (MG/L-SR)    | .008  |
| ALUMINUM, DISS (MG/L-AL)    | <.03   | TITANIUM, DISS (MG/L AS TI)  | .020  |
| SILVER, DISS (MG/L AS AG)   | <.002  | VANADIUM, DISS (MG/L AS V)   | <.001 |
| BORON, DISS (MG/L AS B)     | <.02   | ZINC, DISS (MG/L AS ZN)      | .010  |
| CADMIUM, DISS (MG/L AS CD)  | <.002  | ZIRCONIUM, DISS (MG/L AS ZR) | <.004 |

REMARKS: CLEAR WATER WITH SOME SEDIMENT \*  
THIS IS THE INITIAL POINT OF ENTRY FOR THE BENCH \* USGS BENCHMARK

EXPLANATION: MG/L = MILLIGRAMS PER LITER; UG/L = MICROGRAMS PER LITER; MEQ/L = MILLIEQUIVALENTS PER LITER; FT = FEET; MT = METERS; (M) = MEASURED; (E) = ESTIMATED; (R) = REPORTED; TR = TOTAL RECOVERABLE; TOT = TOTAL; BIO = BIOLOGICALLY AVAILABLE.

OTHER AVAILABLE DATA QW NA S2 WJ OW PW AT OTHER  
OTHER FILE NUMBERS:

PROJECT: COST:  
LAST EDIT DATE: 22-MAR-82 BY: TP \*JKS  
PROCESSING PROGRAM: F1730P V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
70.0 27.2 2.3 0.5 0.9 8.9 90.2 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 81Q0957



MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 82Q0256

STATE MONTANA COUNTY CASCADE  
LATITUDE-LONGITUDE 47D35'45"N 111D59'01"W SITE LOCATION 21N 3W 4\*DDDA  
UTM COORDINATES Z N E MBMG SITE  
TOPOGRAPHIC MAP FAIRFIELD 15' STATION ID 473545111591001  
GEOLOGIC SOURCE \* \* \* SAMPLE SOURCE DITCH OR CANAL  
DRAINAGE BASIN BD LAND SURFACE ALTITUDE 4055. FT < 10  
AGENCY + SAMPLER MBMG\*FNA WATER FLOW RATE  
BOTTLE NUMBER FAIR16U FLOW MEAS METHOD  
DATE SAMPLED 14-MAY-82 STAFF GAGE  
TIME SAMPLED 13:00 HOURS STREAM STAGE  
LAB + ANALYST MBMG\*FNA DEPTH TO SAMPLE  
DATE ANALYZED 10-JUN-82 TOTAL DEPTH OF WATER  
SAMPLE HANDLING 4230 STREAM WIDTH  
METHOD SAMPLED GRAB  
WATER USE IRRIGATION

SAMPLING SITE GREENFIELD CANAL\*APPROX 100 FT SW "A" DROP  
DRAINAGE BASIN SUN RIVER

|                | MG/L  | MEQ/L |                      | MG/L  | MEQ/L |
|----------------|-------|-------|----------------------|-------|-------|
| CALCIUM (CA)   | 51.2  | 2.55  | BICARBONATE (HCO3)   | 178.1 | 2.92  |
| MAGNESIUM (MG) | 13.5  | 1.11  | CARBONATE (CO3)      | .0    |       |
| SODIUM (NA)    | 2.3   | 0.10  | CHLORIDE (CL)        | .4    | 0.01  |
| POTASSIUM (K)  | .7    | 0.02  | SULFATE (SO4)        | 36.7  | 0.76  |
| IRON (FE)      | <.002 |       | NITRATE (AS N)       | .02   | 0.00  |
| MANGANESE (MN) | <.001 |       | FLUORIDE (F)         | .21   | 0.01  |
| SILICA (SIO2)  | 4.8   |       | PHOSPHATE TOT (AS P) |       |       |

TOTAL CATIONS 3.78 TOTAL ANIONS 3.71

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) -0.48

|                             |        |                           |        |
|-----------------------------|--------|---------------------------|--------|
| CALCULATED DISSOLVED SOLIDS | 197.56 | TOTAL HARDNESS AS CaCO3   | 183.41 |
| SUM OF DISS. CONSTITUENT    | 287.93 | TOTAL ALKALINITY AS CaCO3 | 146.07 |
| FIELD CONDUCTVY, MICRONHOS  | 286.   | FIELD ALKALINITY AS CaCO3 |        |
| LAB CONDUCTVY, MICRONHOS    | 332.1  | RYZNAR STABILITY INDEX    | 7.08   |
| FIELD PH                    | 8.41   | LANGLIER SATURATION INDEX | 0.54   |
| LABORATORY PH               | 8.17   | SODIUM ADSORPTION RATIO   | 0.07   |

| PARAMETER         | VALUE | PARAMETER | VALUE |
|-------------------|-------|-----------|-------|
| FIELD TEMP. WATER | 13. C |           |       |

REMARKS: CLEAR WATER WITH SOME SEDIMENT\*CANAL RUNNING APPROX. 25% OF CAPACITY

EXPLANATION: MG/L = MILLIGRAMS PER LITER, UG/L = MICROGRAMS PER LITER, MEQ/L = MILLIEQUIVALENTS PER LITER, FT = FEET, MT = METERS, (M) = MEASURED, (E) = ESTIMATED, (R) = REPORTED, TR = TOTAL RECOVERABLE, TOT = TOTAL, BIO = BIOLOGICALLY AVAILABLE.

OTHER AVAILABLE DATA QW NA S2 WJ OW PW AT OTHER  
OTHER FILE NUMBERS: Y

PROJECT: COST:  
LAST EDIT DATE: 22-JUN-82 BY: TP #JKS  
PROCESSING PROGRAM: F1730P V3 (09/1/83) PRINTED: 30-AUG-84

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
67.5 29.4 2.6 0.5 0.3 20.7 79.0 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 82Q0256

MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406) 496-4101

WATER QUALITY ANALYSIS  
LAB NO. 81Q0960

STATE MONTANA COUNTY TETON  
LATITUDE-LONGITUDE 47D39'13"N 111D47'37"W SITE LOCATION 22N 1W 19\*BBBB  
UTM COORDINATES Z N E NBMG SITE  
TOPOGRAPHIC MAP FAIRFIELD 15' STATION ID 473913111473701  
GEOLOGIC SOURCE \* \* \* SAMPLE SOURCE DITCH OR CANAL  
DRAINAGE BASIN BD LAND SURFACE ALTITUDE 3870.0 FT < 10  
AGENCY + SAMPLER MBMG\*FAN WATER FLOW RATE  
BOTTLE NUMBER FAIR 19 FLOW MEAS METHOD  
DATE SAMPLED 26-JUN-81 STAFF GAGE  
TIME SAMPLED 15:30 HOURS STREAM STAGE  
LAB + ANALYST MBMG\*FNA DEPTH TO SAMPLE 1.0 FT (E)  
DATE ANALYZED 15-JUL-81 TOTAL DEPTH OF WATER  
SAMPLE HANDLING 5330 STREAM WIDTH  
METHOD SAMPLED GRAB  
WATER USE IRRIGATION

SAMPLING SITE GREENFIELD MAIN CANAL JUST BEFORE J DRAIN\*  
DRAINAGE BASIN SUN RIVER

|                | MG/L | MEQ/L |                      | MG/L  | MEQ/L |
|----------------|------|-------|----------------------|-------|-------|
| CALCIUM (CA)   | 31.0 | 1.55  | BICARBONATE (HCO3)   | 117.1 | 1.92  |
| MAGNESIUM (MG) | 7.8  | 0.64  | CARBONATE (CO3)      | 6.0   | 0.20  |
| SODIUM (NA)    | 1.5  | 0.07  | CHLORIDE (CL)        | 1.1   | 0.03  |
| POTASSIUM (K)  | .7   | 0.02  | SULFATE (SO4)        | 10.9  | 0.23  |
| IRON (FE)      | .012 | 0.00  | NITRATE (AS N)       | .05   | 0.00  |
| MANGANESE (MN) | .001 | 0.00  | FLUORIDE (F)         | .05   | 0.00  |
| SILICA (SiO2)  | 4.7  |       | PHOSPHATE TOT (AS P) |       |       |

TOTAL CATIONS 2.27 TOTAL ANIONS 2.38

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) 0.79

|                             |        |                           |        |
|-----------------------------|--------|---------------------------|--------|
| LABORATORY PH               | 8.66   | TOTAL HARDNESS AS CaCO3   | 109.51 |
| FIELD WATER TEMPERATURE     | 20.0 C | TOTAL ALKALINITY AS CaCO3 | 106.05 |
| CALCULATED DISSOLVED SOLIDS | 121.50 | SODIUM ADSORPTION RATIO   | 0.06   |
| SUM OF DISS. CONSTITUENT    | 180.91 | RYZNAR STABILITY INDEX    | 7.31   |
| SPEC. COND. (MICROMHOS/CM)  | 230.3  | LANGLIER SATURATION INDEX | 0.68   |

| PARAMETER                  | VALUE | PARAMETER                   | VALUE |
|----------------------------|-------|-----------------------------|-------|
| DUCTIVITY, FIELD MICROMHOS | 205.  | FIELD PH                    | 8.16  |
| ALKALINITY, FLD (AS CaCO3) | 130.0 | PHOSPHORUS, TOTAL (MG/L-P)  | .052  |
| ALUMINUM, DISS (MG/L-AL)   | <.03  | O-PHOSPHATE, DISS (MG/L-P)  | .015  |
| SILVER, DISS (MG/L AS AG)  | <.002 | LITHIUM, DISS (MG/L AS LI)  | <.002 |
| IRON, DISS (MG/L AS B)     | .05   | SELENIUM, DISS (UG/L-SE)    | .2    |
| ADMNIUM, DISS (MG/L AS CD) | .003  | NITROGEN, KJEL, TO (MG/L-N) | .1    |
| ROMIUM, DISS (MG/L-CR)     | <.002 | CARBON, TOT, ORG. (MG/L-C)  | 2.    |
| PPER, DISS (MG/L AS CU)    | <.002 | MOLYBDENUM, DISS (MG/L-MO)  | <.01  |
| ICKEL, DISS (MG/L AS NI)   | <.01  | LEAD, DISS (MG/L AS PB)     | <.04  |
| FRONTIUM, DISS (MG/L-SR)   | .095  | TITANIUM DIS (MG/L AS TI)   | <.001 |
| ANADIUM, DISS (MG/L AS V)  | <.001 | ZINC, DISS (MG/L AS ZN)     | .006  |
| IRCONIUM DIS (MG/L AS ZR)  | .004  |                             |       |

REMARKS: WATER IS CLEAR WITH SOME SEDIMENT \* THIS WATER IS THE APPROX. END OF  
CANAL WATER BEFORE IT BECOMES WASTE WATER \*

EXPLANATION: MG/L = MILLIGRAMS PER LITER, UG/L = MICROGRAMS PER LITER, MEQ/L =  
MILLIEQUIVALENTS PER LITER, FT = FEET, MT = METERS, (M) = MEASURED, (E) =  
ESTIMATED, (R) = REPORTED, TR = TOTAL RECOVERABLE, TOT = TOTAL.

QW WA S2 WI OW PW AT OTHER

OTHER AVAILABLE DATA  
OTHER FILE NUMBERS:

PROJECT: COST:  
LAST EDIT DATE: 22-MAR-82 BY: TP \*JKS  
PROCESSING PROGRAM: F1730P V2 (11/3/81) PRINTED: 05-MAY-83

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
68.1 28.2 2.9 0.8 1.3 9.5 80.7 8.4

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 81Q0960



MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 82Q0262

STATE MONTANA  
LATITUDE-LONGITUDE 48D39'44"N 111D42'08"W  
UTM COORDINATES Z N E  
TOPOGRAPHIC MAP VAUGHN 15'  
GEOLOGIC SOURCE \*  
DRAINAGE BASIN BD  
AGENCY + SAMPLER MBMG\*  
BOTTLE NUMBER FAIRSCU  
DATE SAMPLED 13-MAY-82  
TIME SAMPLED 12:00 HOURS  
LAB + ANALYST MBMG\*FNA  
DATE ANALYZED 10-JUN-82  
SAMPLE HANDLING 4230  
METHOD SAMPLED GRAB  
WATER USE UNUSED

COUNTY TETON  
SITE LOCATION 22N 01W 14 BDC  
MBMG SITE  
STATION ID 483944111420801  
SAMPLE SOURCE STREAM  
LAND SURFACE ALTITUDE 3580. FT < 10  
WATER FLOW RATE 41.0 CFS  
FLOW MEAS METHOD CURRENT METER  
STAFF GAGE 2.11  
STREAM STAGE  
DEPTH TO SAMPLE 0.2 FT (E)  
TOTAL DEPTH OF WATER  
STREAM WIDTH 29. FT (M)

SAMPLING SITE SPRING COULEE 4.5 MI SO POWER AT USGS GAGE  
DRAINAGE BASIN SUN RIVER

|                | MG/L | MEQ/L |                      | MG/L  | MEQ/L |
|----------------|------|-------|----------------------|-------|-------|
| CALCIUM (CA)   | 53.3 | 2.66  | BICARBONATE (HCO3)   | 218.6 | 3.58  |
| MAGNESIUM (MG) | 20.3 | 1.67  | CARBONATE (CO3)      | 1.0   |       |
| SODIUM (NA)    | 10.8 | 0.47  | CHLORIDE (CL)        | 57.7  | 0.03  |
| POTASSIUM (K)  | .9   | 0.02  | SULFATE (SO4)        | .14   | 1.20  |
| IRON (FE)      | .011 | 0.00  | NITRATE (AS N)       | .33   | 0.01  |
| MANGANESE (MN) | .013 | 0.00  | FLUORIDE (F)         |       | 0.02  |
| SILICA (SIO2)  | 5.1  |       | PHOSPHATE TOT (AS P) |       |       |

TOTAL CATIONS 4.82 TOTAL ANIONS 4.84

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) 0.09

|                             |        |                           |        |
|-----------------------------|--------|---------------------------|--------|
| LABORATORY PH               | 8.28   | TOTAL HARDNESS AS CAC03   | 216.64 |
| FIELD WATER TEMPERATURE     | 13.3 C | TOTAL ALKALINITY AS CAC03 | 179.29 |
| CALCULATED DISSOLVED SOLIDS | 257.28 | SODIUM ADSORPTION RATIO   | 0.32   |
| SUM OF DISS. CONSTITUENT    | 368.19 | RYZNAR STABILITY INDEX    | 6.76   |
| SPEC. COND. (MICROMHOS/CM)  | 429.1  | LANGLIER SATURATION INDEX | 0.76   |

|                      |        |                           |       |
|----------------------|--------|---------------------------|-------|
| PARAMETER            | VALUE  | PARAMETER                 | VALUE |
| TEMPERATURE, AIR (C) | 19.5 C | CNDUCTVY, FIELD MICROMHOS | 455.  |
| FIELD PH             | 8.35   | ALKALINITY, FLD(AS CAC03) | 188.0 |

EMARKS: WIRE LINE READING OF 2.11 ON BRIDGE / STREAM GAGED 20 FT BELOW  
COUNTY BRIDGE

XPLANATION: MG/L = MILLIGRAMS PER LITER, UG/L = MICROGRAMS PER LITER, MEQ/L =  
MILLIEQUIVALENTS PER LITER. FT = FEET, MT = METERS. (M) = MEASURED, (E) =  
ESTIMATED, (R) = REPORTED. TR = TOTAL RECOVERABLE. TOT = TOTAL.

OTHER AVAILABLE DATA  
OTHER FILE NUMBERS:

PROJECT: COST:  
LAST EDIT DATE: 22-JUN-82 BY: TP \*JKS  
PROCESSING PROGRAM: F1730P V2 (11/3/81) PRINTED: 03-MAY-83

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
55.2 34.6 9.7 0.5 0.6 25.0 74.4 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 82Q0262



MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 82Q0263

STATE MONTANA  
LATITUDE-LONGITUDE 47D38'33"N 111D40'46"W  
UTM COORDINATES Z N E  
TOPOGRAPHIC MAP VAUGHN 15'  
GEOLOGIC SOURCE \*  
DRAINAGE BASIN BD  
AGENCY + SAMPLER MBMG\*  
BOTTLE NUMBER FAIRTCU  
DATE SAMPLED 13-MAY-82  
TIME SAMPLED 10:50 HOURS  
LAB + ANALYST MBMG\*FNA  
DATE ANALYZED 10-JUN-82  
SAMPLE HANDLING 4230  
METHOD SAMPLED GRAB  
WATER USE UNUSED

COUNTY TETON  
SITE LOCATION 22N 01W 24 CDB  
MBMG SITE  
STATION ID 473833111404601  
SAMPLE SOURCE STREAM  
LAND SURFACE ALTITUDE 3510. FT < 10  
WATER FLOW RATE 10.0 CFS  
FLOW MEAS METHOD FLUME  
STAFF GAGE 0.38  
STREAM STAGE RISING  
DEPTH TO SAMPLE 0.2 FT (E)  
TOTAL DEPTH OF WATER  
STREAM WIDTH

SAMPLING SITE TANK COULEE 9 MI. NW VAUGHN AT USGS FLUME  
DRAINAGE BASIN SUN RIVER

|                | MG/L | MEQ/L |                      | MG/L | MEQ/L |
|----------------|------|-------|----------------------|------|-------|
| CALCIUM (CA)   | 102. | 5.09  | BICARBONATE (HCO3)   | 361. | 5.92  |
| MAGNESIUM (MG) | 69.1 | 5.68  | CARBONATE (CO3)      | 18.0 |       |
| SODIUM (NA)    | 78.2 | 3.40  | CHLORIDE (CL)        | 18.5 | 0.52  |
| POTASSIUM (K)  | 2.3  | 0.06  | SULFATE (SO4)        | 354. | 7.37  |
| IRON (FE)      | .010 | 0.00  | NITRATE (AS N)       | 1.03 | 0.07  |
| MANGANESE (MN) | .033 | 0.00  | FLUORIDE (F)         | .69  | 0.04  |
| SILICA (SiO2)  | 3.4  |       | PHOSPHATE TOT (AS P) |      |       |

TOTAL CATIONS 14.24 TOTAL ANIONS 13.92

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) -1.03

|                             |        |                           |        |
|-----------------------------|--------|---------------------------|--------|
| LABORATORY PH               | 8.27   | TOTAL HARDNESS AS CaCO3   | 539.11 |
| FIELD WATER TEMPERATURE     | 12.1 C | TOTAL ALKALINITY AS CaCO3 | 296.08 |
| CALCULATED DISSOLVED SOLIDS | 807.10 | SODIUM ADSORPTION RATIO   | 1.47   |
| SUM OF DISS. CONSTITUENT    | 990.26 | RYZNAR STABILITY INDEX    | 5.77   |
| SPEC. COND. (MICROMHOS/CM)  | 1153.  | LANGLIER SATURATION INDEX | 1.25   |

| PARAMETER                  | VALUE  | PARAMETER                  | VALUE |
|----------------------------|--------|----------------------------|-------|
| TEMPERATURE, AIR (C)       | 14.5 C | CNDUCTVY, FIELD MICROMHOS  | 1231. |
| FIELD PH                   | 8.51   | ALKALINITY, FLD (AS CaCO3) | 328.0 |
| LITHIUM, DISS (MG/L AS LI) | .061   |                            |       |

EMARKS: FLUSH OCCURRED JUST AFTER SAMPLING & WENT FROM 0.38 TO 0.80 ON  
STAFF GAGE

LAB: FU CA 89.4, MG 71., NA 80.4 MG/L GIVE .2 SIGMA & 13.9 TOT CATION MEQVS/L

XPLANATION: MG/L = MILLIGRAMS PER LITER, UG/L = MICROGRAMS PER LITER, MEQ/L =  
MILLIEQUIVALENTS PER LITER. FT = FEET, MT = METERS. (M) = MEASURED, (E) =  
ESTIMATED, (R) = REPORTED. TR = TOTAL RECOVERABLE. TOT = TOTAL.

QW WA S2 WI OW PW AT OTHER

OTHER AVAILABLE DATA  
OTHER FILE NUMBERS:

PROJECT: COST:  
LAST EDIT DATE: 24-JUN-82 BY: TP \*JKS  
PROCESSING PROGRAM: F1730P V2 (11/3/81) PRINTED: 03-MAY-83

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
35.8 39.9 23.9 0.4 3.8 53.4 42.8 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 82Q0263



MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 82Q0260

STATE MONTANA COUNTY TETON  
LATITUDE-LONGITUDE 47D33'58"N 111D34'46"W SITE LOCATION 22N 1E 30 CAB  
UTM COORDINATES 2 N E MBMG SITE  
TOPOGRAPHIC MAP VAUGHN 15' STATION ID 473358111344601  
GEOLOGIC SOURCE \* \* \* SAMPLE SOURCE STREAM  
DRAINAGE BASIN BD LAND SURFACE ALTITUDE 3490. FT  
AGENCY + SAMPLER MBMG\*FNA WATER FLOW RATE .1 CFS  
BOTTLE NUMBER FAIR5FU FLOW MEAS METHOD FLUME .06  
DATE SAMPLED 13-MAY-82 STAFF GAGE  
TIME SAMPLED 09:50 HOURS STREAM STAGE  
LAB + ANALYST MBMG\*FNA DEPTH TO SAMPLE  
DATE ANALYZED 10-JUN-82 TOTAL DEPTH OF WATER .1 FT  
SAMPLE HANDLING 4230 STREAM WIDTH  
METHOD SAMPLED GRAB  
WATER USE UNUSED

SAMPLING SITE FLUME #5 GREENFIELD BENCH 7.5 MI NW VAUGHN  
DRAINAGE BASIN SUN RIVER

|                | MG/L  | MEQ/L |                      | MG/L | MEQ/L |
|----------------|-------|-------|----------------------|------|-------|
| CALCIUM (CA)   | 217.  | 10.83 | BICARBONATE (HCO3)   | 318. | 5.21  |
| MAGNESIUM (MG) | 105.  | 8.64  | CARBONATE (CO3)      | .0   |       |
| SODIUM (NA)    | 75.8  | 3.30  | CHLORIDE (CL)        | 6.7  | 0.19  |
| POTASSIUM (K)  | 4.3   | 0.11  | SULFATE (SO4)        | 847. | 17.63 |
| IRON (FE)      | <.002 |       | NITRATE (AS N)       | .04  | 0.00  |
| MANGANESE (MN) | .081  | 0.00  | FLUORIDE (F)         | .86  | 0.05  |
| SILICA (SIO2)  | 9.0   |       | PHOSPHATE TOT (AS P) |      |       |

TOTAL CATIONS 22.88 TOTAL ANIONS 23.08

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) 0.47

|                                |         |                           |        |
|--------------------------------|---------|---------------------------|--------|
| LABORATORY PH                  | 7.83    | TOTAL HARDNESS AS CaCO3   | 974.03 |
| FIELD WATER TEMPERATURE        | 11.8 C  | TOTAL ALKALINITY AS CaCO3 | 260.81 |
| CALCULATED DISSOLVED SOLIDS    | 1422.43 | SODIUM ADSORPTION RATIO   | 1.06   |
| SUM OF DISS. CONSTITUENT       | 1583.78 | RYZNAR STABILITY INDEX    | 5.66   |
| LAB SPEC. COND. (MICROMHOS/CM) | 1714.   | LANGLIER SATURATION INDEX | 1.08   |

|                      |        |                               |       |
|----------------------|--------|-------------------------------|-------|
| PARAMETER            | VALUE  | PARAMETER                     | VALUE |
| TEMPERATURE, AIR (C) | 17.5 C | CONDUCTIVITY, FIELD MICROMHOS | 1114. |
| FIELD PH             | 8.34   | ALKALINITY, FLD (AS CaCO3)    | 278.0 |

REMARKS: SAMPLE IS BACKGROUND OR BASEFLOW ONLY - NO FLUSH HAS OCCURRED AT THIS  
FLUME TO DATE FOR 1982

EXPLANATION: MG/L = MILLIGRAMS PER LITER, UG/L = MICROGRAMS PER LITER, MEQ/L =  
MILLIEQUIVALENTS PER LITER. FT = FEET, MT = METERS. (M) = MEASURED, (E) =  
ESTIMATED, (R) = REPORTED. TR = TOTAL RECOVERABLE. TOT = TOTAL.

OTHER AVAILABLE DATA QW WA S2 WI OW PW AT OTHER  
OTHER FILE NUMBERS:

PROJECT: COST:  
LAST EDIT DATE: 22-JUN-82 BY: TP \*JKS  
PROCESSING PROGRAM: F1730P V2 (11/3/81) PRINTED: 03-MAY-83

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
47.3 37.8 14.4 0.5 0.8 76.6 22.6 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 82Q0260



MONTANA BUREAU OF MINES AND GEOLOGY  
BUTTE, MONTANA 59701 (406)496-4101

WATER QUALITY ANALYSIS  
LAB NO. 82Q0259

STATE MONTANA COUNTY TETON  
LATITUDE-LONGITUDE 47D33'35"N 111D34'03"W SITE LOCATION 22N 1E 32 BDA  
UTM COORDINATES Z N E MBMG SITE  
TOPOGRAPHIC MAP VAUGHN 15' STATION ID 473335111340301  
GEOLOGIC SOURCE \* \* \* SAMPLE SOURCE STREAM  
DRAINAGE BASIN BD LAND SURFACE ALTITUDE 3460. FT  
AGENCY + SAMPLER MBMG\*FNA WATER FLOW RATE 6.5 CFS  
BOTTLE NUMBER FAIR3FU FLOW MEAS METHOD CURRENT METER  
DATE SAMPLED 13-MAY-82 STAFF GAGE  
TIME SAMPLED 08:30 HOURS STREAM STAGE  
LAB + ANALYST MBMG\*FNA DEPTH TO SAMPLE  
DATE ANALYZED 10-JUN-82 TOTAL DEPTH OF WATER 0.6  
SAMPLE HANDLING 4230 STREAM WIDTH  
METHOD SAMPLED GRAB  
WATER USE UNUSED

SAMPLING SITE WEIR #3 GREENFIELD BENCH\*6 MI NW VAUGHN  
DRAINAGE BASIN SUN RIVER

|                | MG/L  | MEQ/L |                      | MG/L   | MEQ/L |
|----------------|-------|-------|----------------------|--------|-------|
| CALCIUM (CA)   | 73.3  | 3.66  | BICARBONATE (HCO3)   | 255.0  | 4.18  |
| MAGNESIUM (MG) | 31.9  | 2.62  | CARBONATE (CO3)      | 0      |       |
| SODIUM (NA)    | 19.7  | 0.86  | CHLORIDE (CL)        | 2.3    | 0.06  |
| POTASSIUM (K)  | 1.3   | 0.03  | SULFATE (SO4)        | 137.37 | 2.85  |
| IRON (FE)      | <.002 |       | NITRATE (AS N)       | .37    | 0.03  |
| MANGANESE (MN) | .028  | 0.00  | FLUORIDE (F)         | .44    | 0.02  |
| SILICA (SIO2)  | 6.1   |       | PHOSPHATE TOT (AS P) |        |       |

TOTAL CATIONS 7.17 TOTAL ANIONS 7.15

STANDARD DEVIATION OF ANION-CATION BALANCE (SIGMA) -0.13

|                             |        |                           |        |
|-----------------------------|--------|---------------------------|--------|
| LABORATORY PH               | 7.71   | TOTAL HARDNESS AS CaCO3   | 314.33 |
| FIELD WATER TEMPERATURE     | 8.5 C  | TOTAL ALKALINITY AS CaCO3 | 209.14 |
| CALCULATED DISSOLVED SOLIDS | 398.05 | SODIUM ADSORPTION RATIO   | 0.48   |
| SUM OF DISS. CONSTITUENT    | 527.44 | RYZNAR STABILITY INDEX    | 6.92   |
| SPEC.COND.(MICROMHOS/CM)    | 603.2  | LANGLIER SATURATION INDEX | 0.40   |

| PARAMETER            | VALUE  | PARAMETER                     | VALUE |
|----------------------|--------|-------------------------------|-------|
| TEMPERATURE, AIR (C) | 17.4 C | CONDUCTIVITY, FIELD MICROMHOS | 650.0 |
| FIELD PH             | 8.44   | ALKALINITY, FLD(AS CaCO3)     | 228.0 |

REMARKS: FLUSH WATER PROBABLY OCCURRED ON 5-9-82 & HAS RESUMED TO CURRENT BASE FLOW

EXPLANATION: MG/L = MILLIGRAMS PER LITER, UG/L = MICROGRAMS PER LITER, MEQ/L = MILLIEQUIVALENTS PER LITER. FT = FEET, MT = METERS. (M) = MEASURED, (E) = ESTIMATED, (R) = REPORTED. TR = TOTAL RECOVERABLE. TOT = TOTAL.

OTHER AVAILABLE DATA  
OTHER FILE NUMBERS:

PROJECT: COST:  
LAST EDIT DATE: 22-JUN-82 BY: TP \*JKS  
PROCESSING PROGRAM: F1730P V2 (11/3/81) PRINTED: 03-MAY-83

PERCENT MEQ/L (FOR PIPER PLOT)  
CA MG NA K CL SO4 HCO3 CO3  
51.0 36.6 11.9 0.5 0.9 40.2 58.9 0.0

NOTE: IN CORRESPONDENCE, PLEASE REFER TO LAB NUMBER: 82Q0259